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PART II:

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CONTROL OF AIR POLLUTION FROM NEW MOTOR VECHICLES AND NEW MOTOR VECHICLE ENGINES

Selective Enforcement Auditing Procedures

Title 40—Protection of Environment

CHAPTER I—ENVIRONMENTAL PROTECTION AGENCY

[FRL 587-2]

PART 86—CONTROL OF AIR POLLUTION FROM NEW MOTOR VEHICLES AND NEW MOTOR VEHICLE ENGINES

Selective Enforcement Auditing Procedures

These regulations establish an emissions testing program for new automobiles coming off the assembly line in order to ensure that these vehicles conform to the pollution control requirements of the Clean Air Act. This program will be known as "Selective Enforcement Auditing" or "SEA."

Emission standards for new automobiles have been in effect since the 1968 model year. To date, however, testing to make sure those standards are met has largely been confined to preproduction prototypes, and many vehicles in actual use are not meeting the standards. Such failure to meet standards in use could be the result of inadequate prototype evaluation procedures, differences between prototypes and production vehicles, and/or lack of proper maintenance in use. The regulations approved today are one step toward correcting that situation.

I. The Rulemaking Proceeding

These regulations were published for comment in proposed form on December 31, 1974. 39 FR 45360. A comment period of sixty days was initially provided, but this was extended for another forty-five days at the request of the auto manufacturers to all more time for the preparation of detailed comments. 40 FR 5169 (Feb. 4, 1975). Two trade associations, two Federal agencies, and seventeen manufacturers submitted written comments on the proposal.

After the close of this initial comment period, informal meetings were held at the request of General Motors on May 7, 1975 and of Ford Motor Company on May 20, 1975 to discuss the objections of these two manufacturers to the proposed SEA program. No other requests for such a meeting were received.

After these meetings, in order to obtain more information on certain technical issues and to solicit comment on certain alternative ways of conducting the program, EPA in effect reopened the comment period. On June 19, 1975, it announced in the Federal Register that a public hearing would be held beginning July 22 to consider the SEA proposal. 40 FR 25851. The exact topics to be discussed were specifically listed in the hearing notice.

Five manufacturers—American Motors, Chrysler, Ford, General Motors and Volkswagen—participated in the hearing, which lasted two days. In response to manufacturers' requests, a thirty day period was provided after the hearing for submittal of additional information. Tr. I-137; II-196.[1] In addition, EPA agreed to accept and evaluate any additional data and argument that were submitted even after the close of this public comment period as long as it was received before the rules were put in final form. See letters to Ford Motor Company, dated August 8, 1975 and to General Motors, dated August 14, 1975. Manufacturers have in fact taken advantage of this opportunity. For example, a representative of Ford sought and received an appointment with the Administrator to discuss issues relating to this program.

Although the promulgation of SEA requirements is informal rulemaking not required to be based on a fixed record, EPA established an SEA docket in the Freedom of Information Center in Washington on April 4, 1975. Various documents, including the proposed rules themselves, hearing transcripts, all comments received, and contractor reports on technical and statistical questions were placed in the docket during the rulemaking. See Tr. I-15; GM Statement p. 12.

In addition, all parties to the rulemaking treated certain other information as a matter of public record, and presented analyses and arguments based on it even though it had not been formally included in the rulemaking docket. This information consisted of the EPA certification testing results for all manufacturers for recent years, and data from California's own assembly line testing program and whatever additional assembly line testing the manufacturers carried out of their own volition. This data is made freely available by the regulatory agencies for which it is prepared, and is widely known to and dealt with by the responsible staffs in the industry. See C. Comm. Appendix B, F. Comm. App. A-13, A-14, A-15; GM Comm. IV-I, Tr. I-179-80 (VW); II-90, 98 (Ford). Indeed, during the hearings on suspension of 1977 exhaust emissions standards, all the manufacturers' most recent California data as well as production vehicle emission data acquired through their own in-house testing programs had been subpoenaed by EPA specifically because of its potential relevance to this program. See 1977 Suspension Hearing Transcript pp. 125-29, 158-59 (Chrysler); 509-510 (GM). The record of those suspension proceedings was often referred to by participants in this rulemaking. C. Comm. p. 3, 4; Appendix A p. 1; F. Comm. III-3, App. A-2, GM Comm. IV-1, VIII-9.

II. The Outline of the Proposal

In developing the SEA proposal, EPA made several basic choices which have remained unchanged in the final version. Since to a large extent these choices have determined the form of the program, they are briefly described here.

1. Use of a sampling approach

Section 206(b) of the Clean Air Act explicitly authorizes EPA, in setting up an assembly line testing program, to form its judgments either by testing every car affected, or by picking a representative sample and testing that.

SEA is a sampling program. Only a small number of the cars potentially affected by a judgment that standards are not met will in fact be tested; the performance of the others will be determined by statistical inference from the performance of the sample.

There were several reasons for adopting this approach. The test currently used to measure emissions from motor vehicles takes about forty-five minutes per vehicle to perform. Overnight conditioning of the vehicle by keeping it at a given temperature is also required. In addition, some manufacturers believe that a vehicle that has just come off the assembly line may not give a representative performance on this test, and that it should be driven for a certain period before it is tested. These regulations give such manufacturers the right to accumulate mileage on test vehicles at their option.

For all these reasons, testing every vehicle coming off the line would be extremely expensive and time-consuming for both the manufacturer and for EPA. There is no way at present to shorten testing time, since the emission standards are defined in terms of the test procedure described above, and no other shorter test procedure has been established that correlates adequately with the first one.

Nor is testing every vehicle necessary to accomplish the goals of the program. SEA in its current form is meant simply as a check on the manufacturers' quality

[1] In this Preamble, the following abbreviated citations are used:

Tr.—The transcript of the public hearing held July 22 and 23, 1975, to consider the SEA proposal.

C. Comm.—Comments of Chrysler Corporation submitted April 17, 1975.

DB Comm.—Comments of Daimler-Benz submitted April 17, 1975.

F. Comm.—Comments of Ford Motor Company submitted April 17, 1975.

T. Comm.—Comments of Toyota Motor Sales, U.S.A., Inc. submitted April 17, 1975.

GM Comm.—Comments of General Motors Corporation submitted April 17, 1975.

N. Comm.—Comments of Nissan Motor Co. submitted April 12, 1975.

MVMA Comm.—Comments of the Motor Vehicle Manufacturers Association submitted April 17, 1975.

VW Comm.—Comments of Volkswagen, submitted March 27, 1975.

H. Comm.—Comments of Honda Motor Co. submitted April 11, 1975.

C. Statement—The statement of Chrysler Corporation prepared for delivery at the July 22 hearing.

F. Statement—The statement of Ford Motor Company prepared for delivery at the July 22 hearing.

GM Statement—The statement of General Motors Corporation submitted to EPA at the opening of the July 22 hearing.

F. Mem.—The post-hearing memorandum of Ford Motor Company dated August 22, 1975.

VW Mem.—The post-hearing submission by Volkswagen, dated August 26, 1975.

control procedures; it is not meant to specify what those procedures should be. To avoid undue interference with the manufacturers' efforts here, it is desirable to keep testing to a minimum. This can be done without damage to the beneficial effects of the program as long as EPA retains the right to make its tests on a random and unpredictable basis. In that case, the manufacturer will have an incentive to maintain a good quality control program for all its vehicle configuration, since it will not be able to anticipate exactly which ones will be in fact selected for testing. See Tr. I–18, I–20, II–62, II–192–93.

The concept of initiating testing by means of a test order is used in order to allow the Administrator to focus attention upon those vehicle configurations which EPA wants to assure are in compliance and at a time when the Agency feels it is appropriate to do so. Since testing will only be required of particular vehicle configurations, the testing load imposed on the manufacturers will be considerably less than would result from having to simultaneously test all configurations. Selective testing will enable EPA enforcement officials to closely monitor test vehicle selection, preparation, and testing thus providing greater assurance whether the configurations in question are or are not in compliance. In the event vehicles of a particular configuration are found not to be in compliance, the selective testing concept allows attention to be focused on other configurations of that same engine family. Thus, SEA will achieve the same ends as requiring all configurations to be tested without resulting in the large testing burden that such an approach entails.

2. THE DESIGN OF THE SAMPLING PROGRAM

Statistical sampling consists of taking a small number of objects from a population of objects, analyzing the extent to which the selected objects display certain characteristics, and then making a mathematical estimate about the probable extent to which the population as a whole will display the same characteristics as the sample. In SEA, for example, the objects at issue are motor vehicles, the characteristics to be measured are emissions of three specified pollutants, and the estimate to be made concerns the extent to which the emissions control performance of the sample will reflect the performance of the population as a whole.

Accordingly, the first step in designing any sampling program is to define the population whose characteristics are to be measured. For SEA, this was done by starting with the existing practice of dividing all motor vehicles subject to the Clean Air Act requirements into "engine families." Vehicles in different engine families might be expected to have different emission characteristics. For that reason, EPA has always required that prototype vehicles from each separate engine family be separately tested and pass the emissions test before vehicles of that family may be sold. Since certifying an engine family is expensive and time-consuming, the number of engine families that can be tested each year is necessarily limited. Since the purpose of certification is to gain demonstration of a manufacturer's emission design capability across the spectrum of his planned production, engine families are defined fairly broadly and to some extent each family includes different subclassifications of vehicles that may differ somewhat in emissions performance. Since the focus of SEA is more selective, the population to be tested for SEA purposes will be a "configuration," which is a subclass of an engine family selected on the basis of certain characteristics which may be expected to affect emissions, such as engine code, weight, type of transmission, drive ratio, and the like. Cars in a configuration can be expected to be more similar to each other mechanically, and thus in emissions performance, than cars in the engine family as a whole.

Once the population has been defined, the next step is to determine how to select the sample from it. The approach EPA adopted would work by first selecting a "batch" of vehicles in a configuration for testing. A batch would normally consist of all vehicles of that configuration produced at a plant during a shift. The purpose of using this flexible batch designation is to select batch sizes small enough to keep the number of vehicles to be tested at a reasonable level and yet be large enough to enable EPA to draw statistically valid conclusions about the emissions of all vehicles of that configuration produced at that plant. Samples of vehicles from the batch would be chosen and tested until a judgment could be reached about the state of compliance of the batch, and batches would be tested through this process until a judgment could be made about the state of compliance of the population.

Sequential batch sampling, because it relies on testing small samples in sequence rather than a single large sample all at once, allows judgments to be reached in clear cases more quickly than the latter approach. In addition, selecting vehicles over a short period of time will make it possible to test a number of assembly lines over the course of a year.

An alternative to drawing off small samples quickly, as in batch sampling, is known as "continuous sampling." This involves testing some fixed or variable percentage of all production vehicles of the selected configuration on a continuous basis. The batch testing concept embodied by SEA will be just as effective an enforcement tool as continuous testing and offers a number of advantages that continuous testing does not. Since testing will only be required on a short term basis, the testing load imposed on the manufacturers will be considerably less than would result from EPA-imposed continuous testing. SEA will achieve the same ends as continuous assembly line testing without imposing a government-selected full time testing requirement.

After the sample has been drawn, the next step is to choose the type of stateristic of the population that is being predict the characteristics of the parent population. In SEA, that choice is bound up with the choice of the exact characteristics of the population that is being measured, or, in more technical words, the choice between an "attributes" approach and a "variables" one.

An "attributes" approach divides all members of the sample into two classes depending on whether they do or do not exhibit a given characteristic. For SEA, the division is based on whether or not a vehicle will meet the emissions requirement for a given pollutant. The number of vehicles in the sample that meet the requirement can then be used to predict how many in the parent population will likewise meet it.

Unlike "attributes" sampling, which is based on putting a simple pass/fail label on each sampled vehicle, "variables" sampling asks about the extent to which a given characteristic is exhibited. For SEA, the question would be exactly how high the emissions from each vehicle in the sample were.

EPA has chosen an "attributes" approach for SEA. We believe that in the end, the Clean Air Act contemplates that the emission standards apply to individual vehicles. Accordingly, the question which attributes sampling asks, namely "Do these vehicles meet the standards or not?" is more directly relevant to the ultimate statutory purpose than the one generally asked by "variables" sampling "How high are the emissions from these vehicles?" See C. Comm. App. D p. 2 ("Inspection by attributes assumes * * * that the magnitude of passing or failing is not as meaningful as the characteristic of passing or failing").

However, where variables sampling can validly be applied, it is possible to use it also to draw conclusions about the percentage of the members of a population that will exceed a given standard. In addition, variables sampling, where it can validly be applied, maximizes the reliability with which conclusions can be drawn from a given number of sample tests. This would tend to make its use desirable where the test at issue is somewhat difficult or expensive to perform, as is the case where auto emissions are concerned. See C. Comm. App. D p. 2.

The basic problem with applying a variables approach to SEA is that "variables" sampling will not yield valid results for predicting what percentage of the population exhibits values below a certain level unless the distribution of the population's emissions is known. By contrast, "attributes" sampling will yield reliable predictions of the extent to which members of the population exceed a given value whatever the shape of the underlying distribution. See C. Comm. App. D pp. 1–2, App. E p. 1, Tr. I–69 (GM); Tr. II–125–26 (Ford). Considerable analysis of vehicle emission data by EPA indicates that no one type of distribution consistently describes emission data. If a distribution were assumed and a variables plan were to be used, EPA would have considerably reduced assurance about the statistical validity of any conclusions made about the compliance of the vehicles from

which samples are drawn. An improper conclusion could be to the detriment of either EPA or a manufacturer. If the results of the sampling plan indicated that vehicles were in compliance but in fact they were not, then EPA would unknowingly be permitting the manufacturer to distribute noncomplying vehicles into commerce. In the reverse situation, EPA would be stopping sale of the vehicles when they in fact were complying. Adopting a variables approach could therefore provide results of questionable statistical validity.

The final step in putting together the statistical framework for SEA was to determine the percentage of cars in a population that would have to meet the emission requirements in order to avoid possible suspension or revocation of the certificate of conformity for the particular configuration tested. In the proposal, EPA set that value at 90 percent, though clear notice was given that other, less stringent values would also be considered, particularly for the first few years of the program. This reflected EPA's view that the statute requires every car be warranted to meet the emissions standards, while allowing 10 percent for measurement error and inevitable quality abberations, total elimination of which is not practical at the assembly line. This choice was expressed by proposing that the "Acceptable Quality Level" (AQL), which is the percentage of vehicles in a population which will be allowed not to meet the emission requirement, be set at 10 percent.

With this choice made, it was possible by accepted statistical methods to draw up a sampling program that would conclude with given confidence that a population did or did not meet the criterion.

Although it is an inherent characteristic of sampling plans that the risk of drawing an incorrect conclusion can never be entirely eliminated when drawing conclusions about the characteristics of a population from the behavior of a sample, only sampling schemes that had a "producer's risk" for each pollutant (the chance of rejecting a population that in fact meets the 10 percent AQL for that pollutant) of less than five percent were considered by EPA. Accepting a five percent "producer's risk" is normal practice. C. Comm. App. D. p. 1. Selection of sampling plans also involves consideration of the "consumer's risk" (the chance of accepting a population that in fact exceeds the 10 percent AQL). Once the "producer's risk" is fixed, the "consumer's risk" is directly related to the sample size. That is, the larger the sample size, the smaller the "consumer's risk." Obviously, it is EPA's desire to keep the "consumer's risk" to a minimum. However, since this would require large samples, EPA has selected sampling plans which represent a compromise between sample size and "consumer's risk."

3. ADJUSTMENT FOR DETERIORATION

To run an effective assembly-line test program, it is not enough to have a valid sampling scheme. The assessment of the emissions performance of sample vehicles must also be meaningful.

To a large extent, the emission measurement techniques to be used were not in fact controversial. The Federal vehicle emission standard, like any other emission standard, is defined in terms of a given test procedure, the FTP, and that test procedure will be used for SEA. However, though the law requires all vehicles to be warranted to meet the standards for at least 50,000 miles, and though this mileage is actually accumulated in certification on prototypes of at least some of the cars, it would obviously be impracticable for all cars subject to SEA testing to be run for 50,000 miles. Indeed, in many cases to require the cars to be run even to the 4,000 mile point at which tests to determine compliance begin during certification would be burdensome to the manufacturer.

Yet at the same time there is considerable evidence that auto emission performance often deteriorates between 4,000 miles and 50,000 miles, and some evidence that it may deteriorate, ameliorate, or at least vary widely between 0 and 4,000 miles as well.

In the proposal, therefore, EPA required that this deterioration or potential deterioration be accounted for. This would be done by mathematically projecting what the emissions of each vehicle tested off the assembly line would have been at 50,000 miles had it been run that far. To account for the deterioration between 4,000 and 50,000 miles, the standards would be divided by the "deterioration factor" for that distance demonstrated by the appropriate certification car, and the resulting "low mileage emission target" would be compared to the test results. To account for deterioration or amelioration between the mileage at which the test was actually performed and the 4,000 mile point, an additional adjustment would be required which could be calculated by one of several alternative means. It could be estimated using data either from certification cars or from actual production vehicles, or the cars could be driven for 4,000 miles and the actual deterioration or amelioration measured.

4. THE MECHANICS OF THE PROPOSAL

The preamble to the SEA notice of proposed rulemaking contains a full account of the actual mechanics of the SEA program. Very briefly, it would provide for starting a given test sequence by issuing a "test order" to a manufacturer, covering vehicles of a particular configuration built at a particular plant. The order would specify batch size. The manufacturer would then have to randomly sample and test vehicles from a normal consecutive run of vehicles constituting the batch. Sampling and testing would continue, as specified in tables annexed to the proposal, until a definite decision to accept or to reject the batch could be made. In some cases, testing of additional batches by the same process might be required until a decision could be reached as to whether vehicles in the configuration as a whole met the emission standards in the required percentages. If they did not, the certificate that enables the vehicles to be legally sold could be revoked or suspended by EPA. The manufacturer would then be entitled to a full formal administrative hearing before the agency, with right of appeal to the courts, as to whether the tests had been properly conducted or any sampling methods had been properly applied.

III. COMMENTS RECEIVED AND THE FINAL VERSION OF THE REGULATION

1. "AVERAGING" AND THE 10 PERCENT AQL

Without doubt the most controversial aspect of the proposed regulations concerned EPA's proposal that no more than 10 percent of the vehicles coming off the assembly line should exceed the emission standards that applied in certification. The manufacturers attacked this proposal as both illegal and as economically disastrous. They claimed that, if implemented, it would result in loss of certification for the majority of their engine families, with consequent repercussions on employment and profitability, and that, even if it could be met, that could only be done by adding more emission control equipment, thus decreasing fuel economy and increasing sulfate emissions and price. C. Comm. 2–10, 15–19, 23–24, Appendix A; F. Comm. I–2–4, II–15–26, III–3–7, Appendix A; GM Comm. III–17–22, IV, V, VI; MVMA Comm. 14–30; Tr. I–10–12 (GM), II–100 (Ford).

The legal arguments on this point have been rejected on the advice of my General Counsel. Though EPA does not agree with the companies' averaging position as a matter of law, an AQL (40 percent) that approximates an averaging approach in terms of regulatory impact is being set in order to implement SEA in a manner not unreasonably burdensome to the auto companies. The 40 percent AQL represents a level in emissions performance which is currently being bettered by all but a few of the highest emitting engine families and therefore will not require any major extra control effort or shift in designs on the part of the auto companies.

If auto emissions were distributed through the population of cars exactly according to the familiar bell-shaped or "normal" distribution, as shown in Figure 1, "averaging" could be achieved by setting an AQL of 50 percent. At that level, the peak of the distribution would be just at the standard, and, since the shape is symmetrical, as many cars would be below the standard as above it, and to the same extent.

In actual fact, however, it is almost universally agreed that the distribution of auto emissions at today's low standards is not "normal." This was admitted by manufacturers both during the SEA rulemaking and during the proceedings for suspension of 1977 exhaust emission standards. C. Comm. App. A p. 1 (log-normal distribution); Tr. I–120–121 (GM). "[I]n almost every sample investigated, the distribution (of emission results) is skewed toward high emissions * * *. The log normal distribution has been found to provide the best fit

in many situations." GM Comm. IV–2; VW Mem. 5–6. Since it is progressively more difficult to achieve very low emission results, and since a few "unlucky" cars can have emissions many times in excess of the standards, while no car can have emissions less than zero, the distribution of emission results tends to be biased or "skewed" toward the high end of the range, as shown in Figure 2. As this figure indicates, when such a bias is present, an AQL of 50 percent will allow average emissions to exceed the standard, since the half of the cars which are over the standard will in general be farther over it than the cars which are under the standard will be under it. To partially counteract this effect, EPA did not pick an AQL of 50 percent, which would be appropriate if a strict normal distribution applied, but rather one of 40 percent.

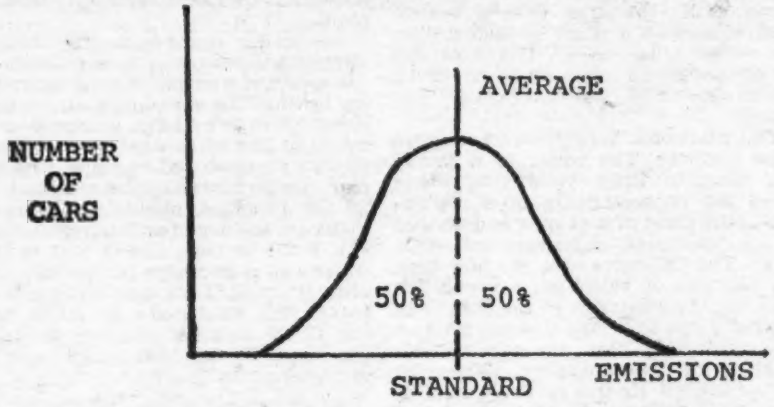

FIGURE 1. NORMAL DISTRIBUTION

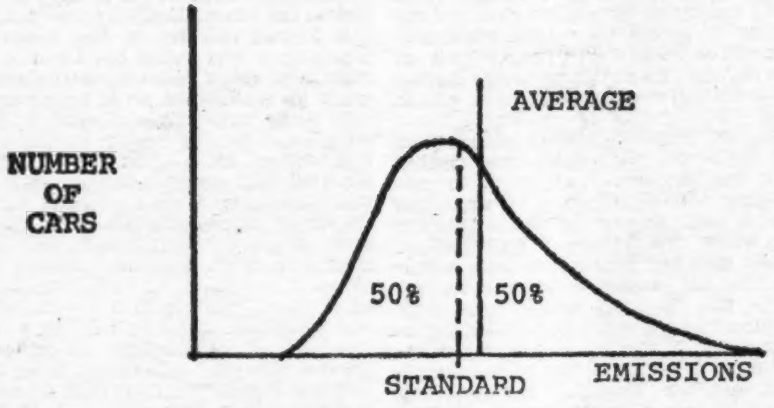

FIGURE 2. SKEWED DISTRIBUTION

Some manufacturers indicated in their comments that this AQL did indeed in their opinion approximate "averaging." C. Comm. App. D p. 4 ("[A] 40 percent AQL would correspond approximately to passing on the average"); H. Comm. 3; Tr. I–120 (GM), II–81 (AMC). See also GM Comm. IV–4 ("For skewed distributions like the log normal, the mean of the distribution is not at the 50th percentile; therefore, the mean could exceed the standard and still have more than 50 percent passing.") Table II of that comment indicates that a 40 percent AQL approximates averaging more closely than any other. See also GM Comm. V–7 (Table II), VI–A–1 (Table 1), VI–A–2 (Table ID. In making such a statement, these manufacturers also admitted that they could meet that level of control without too much difficulty, since they claimed that they built the average production vehicle to meet standards now.[2]

[2] Though Volkswagen did testify that a 40 percent AQL did represent a significant increased burden on them, the context makes clear that the technical burden of complying would not be great, but that any assembly-line testing program that might bar the sale of vehicles presented a significantly increased burden in their estimation. Tr. I–193. VW stated that a large safety factor would have to be built into their production emission distribution to guard against any possible failure of an audit. See also Tr. I–198 (all 1975 VW configurations would pass SEA).

Though Ford stated that "50 percent would be the 'typical' AQL that would approximate quality for SEA and certification for Ford," F. Comm. pp. I–2, II–24, the analysis presented showed that what this meant was that at the level of the 1977 standards only for six of the possible 45 engine-family pollutant test combinations would a 50 percent AQL require Ford to do anything different than at present. Twenty-seven of those 45 combinations, according to the analysis, would when certified automatically comply with a 40 percent AQL even at present F. Comm. App. A–6, second table. Of course, it is not EPA's purpose to set an AQL exactly equal to "averaging" in every case as this approach seeks to, but rather to set one that is a reasonable approximation to current production and can be met without too much effort.

Finally, according to EPA's analysis of data submitted during this rulemaking, 29 out of 38 of the domestic light-duty vehicle engine families (representing 80 percent of production) for which manufacturers submitted data were complying in the 1975 model year with a 40 percent AQL. (See economic analysis, Table 4). For the 1976 model year, 48 out of 53 of the domestic light-duty vehicle families (representing 94 percent of production) are complying with a 40 percent AQL. Of course, the emission standards for 1977 are almost identical to those for 1975, which should allow manufacturers to improve their quality control even without the incentive of SEA.

Of the 53 1976 engine families for which data was provided, 24 are presently complying with a 10 percent AQL and are essentially in compliance with the law. In order to bring the noncomplying engine families into compliance, manufacturers would have to make significant improvements in quality control and in some cases lower the engineering design targets for their nonncomplying engine families. These kinds of changes could not be made on short notice and would require some reasonable period of time to institute.

Any change in the AQL will be made through the rulemaking process with full opportunity for public comment. The approach taken here, then, of not setting the AQL at 10 percent will provide manufacturers the time and flexibility to bring all their vehicles into conformance with the standards on a reasonable schedule. Such a schedule can be compatible with their parellel efforts to improve fuel economy and which does not expose them unduly to the risk of loss of certification while they are learning to bring their production vehicles into compliance with the law.

The AQL established by these regulations is intended to apply only to SEA

and should not be construed as being applicable to other enforcement provisions established by the Clean Air Act.

2. REJECTION OF THE MANUFACTURERS SUGGESTED ALTERNATIVE PROGRAMS

All three major domestic manufacturers suggested alternative assembly line test programs to substitute for SEA. These programs have been rejected for two reasons.

First, most of the plans were designed specifically to determine whether the average emissions of a population of vehicles exceeds the standards.[3] This goal is inconsistent with our interpretation of the law.

The results of such an approach might not differ too much from SEA with a 40 percent AQL. In future years, however, if a change in the AQL is needed, a complete rewriting and rethinking of the manufacturers' plans would be needed to accomplish the same result. "(T)he Chrysler plan, in common with those of GM and Ford, is aimed at establishing 'compliance on the average.' If the criterion is to be compliance by each individual vehicle, all plans must go 'back to the drawing board.'" "Evaluation of Sampling Plans Developed by Automobile Manufacturers," report by Research Triangle Institute to EPA, September 1975, p. 22.

Second, all the manufacturers' plans depend on knowing the distribution of auto emissions throughout the population of cars as a whole. Chrysler and GM assume, contrary to logic and the general consensus, that this distribution is normal. Ford assumes that it is a type of skewed distribution known as a Weibull distribution.

EPA does not agree that any of the suggested distributions has been demonstrated to apply to all cases. Though each manufacturer might be willing to accept the errors associated with the kind of distribution it favors, even that is doubtful. Tr. I–72–73 (GM); I–175–180 (VW); II–65–66 (AMC). More important, as long as there is disagreement as to which distribution should properly be used, the better approach in setting up a program that will bind all manufacturers seems to be to use an approach that is valid whatever the underlying distribution is, as is the case with an attributes plan.[4]

[3] Plans submitted by Ford and Volkswagen, while not suffering from this defect, incorrectly, in EPA's opinion, assumed particular underlying distributions of emission data, and were therefore rejected. VW Comm. P. 20; F. Statement.

[4] Ford did claim that its variables plan would yield accurate results largely independent of the distribution of vehicle emissions. See, e.g., F. Mem. at 86. What is meant, however, is that the Ford plan predicts average emissions with relative insensitivity, not that it predicts AQL in this manner. Use of the Ford approach, therefore, requires prior acceptance of "averaging." See the labels on the horizontal axes of the two curves given on F. Mem. Attachment IV p. 1. Ford's alternative AQL plan, however, is sensitive to changes in the distribution of vehicle emissions.

3. REJECTION OF THE MANUFACTURERS' STATISTICAL CRITICISMS OF THE EPA SAMPLING PLAN

The manufacturers devoted relatively little effort to satistical criticisms of the EPA sampling plan, and particularly little to criticism of the revised version that was made available at the time the public hearing was announced. In addition, some of the criticisms, like Ford's comment that a 40 percent AQL approach will sometimes pass a vehicle class with lower average emissions than the one it fails, see Tr. II–128–29, are simply objections once again to EPA's failure to adopt an "averaging" approach.

Two comments here, however, deserve some response. The power of a sampling plan to draw valid conclusions about the characteristics of a population from those of a sample is described by its "operating characteristic" (OC) curve. The OC curve specifies how high the chances of rejecting a population that actually conforms to the test, or of accepting one that does not, are under a given sampling plan for any possible make-up of the population. OC curves were included in the revised sampling plan made available by EPA. No serious criticism of the accuracy of the OC curves has been received. Some manufacturers pointed out, however, that the OC curves differed with differing batch size. Generally, the smaller the batch, the more unfavorable the OC curve was to EPA.

This is a characteristic of the final plan that EPA is willing to accept. Since in all cases the "producers risks" of rejecting an acceptable vehicle configuration will be below the customary limit of five percent, no prejudice to the manufacturers will result from varying sample sizes.

Second, General Motors objected to the use of the "hypergeometric" rather than the "binomial" approach to calculating the significance of what the sample tests showed for the population as a whole. The "binomial" approach assumes that the population from which samples are drawn is infinite in size while the "hypergeometric" approach requires no assumptions about the population size. If the population is not infinite but is large relative to the sample size, then the "binomial" approach will result in only a small amount of error in drawing conclusions about the population. However, if the population is small, which is the case for SEA when small batch sizes are used, than the "binomial" approach can result in appreciable error. Since the "hypergeometric" approach does not result in any error when the population size is small, this is the approach EPA has selected.

The sampling plans in the final regulations require fewer vehicles to be tested than those in the proposed regulations and thus reduce the time required to make a decision regarding whether the vehicles are complying with the AQL. As the sampling plans appeared in the proposed regulations, a manufacturer was required to inspect four to six additional batches if the required number of batches was not accepted initially. The sampling plans in the final regulations call for inspection of two consecutive batches at a time so that at any point in the sampling procedure, it is possible that only two additional batches must be inspected before sampling can be terminated. The net effect is a reduction in the expected number of batches inspected over the original sampling plans.

Two other changes to the proposed sampling plans result in a reduction of the expected number of vehicles requiring testing. The sampling plan for batch size C (16 to 25 vehicles) originally called for sampling of two vehicles at a time up to a maximum of fourteen. The final plan specifies two samples of sizes three. In the proposed regulations, sampling plans are included for batch sizes E (51–90), F (91 to 150), and G (151 to 280), which call respectively for multiple sampling of up to 21, 23, and 56 vehicles per batch. The final plans go up to batch size D (26 or more vehicles) for which the maximum multiple sample size is 6 per batch.

4. OTHER STATISTICAL COMMENTS AND CHANGES

A variety of other comments on the statistical aspects of the program were offered by the manufacturers. Some of these have been accepted, and others have not. The exact comments, and the changes made, are set out below.

1. *"Home plant" testing.* Under SEA as proposed, EPA would be able to test cars at any assembly plant selected. General Motors objected to this approach, which they said would put them to the expense of either installing testing equipment at each plant or of transporting cars to be tested from a plant without equipment to one which did have it. GM. Comm. IX–2–4; Tr. I–88–91. They asserted that complete random selection was unnecessary, since there is such a degree of common origin to the parts used at the different plants, and such similarity in the assembly process, that there is no reason to expect that cars of a given configuration assembled at one plant will differ in emissions from cars of that configuration assembled at another. Chrysler appeared to agree with General Motors. Tr. II–217–18. As an alternative, they suggested that they be allowed to designate the plant at which testing of a given configuration would take place.

Ford, by contrast, accepted the idea of testing at every plant and, as a corollary, objected to extrapolating the results of testing a configuration at one plant to any other plant producing that configuration. F. Comm. II–41–42.

Given the degree of product homogeneity that the auto industry constantly strives to achieve, there seems no a priori reason to assume that cars of the same configuration produced at different plants will differ significantly in their ability to meet emissions standards. Ford presented no data to indicate the con-

trary. Accordingly, GM's position on this point has been accepted. It is a necessary consequence of this position that if cars at the test plant fail SEA, cars of the same configuration produced at other plants may also be deemed to fail it. See Tr. I–82–83, 86–97 (GM). This position has been written into the final regulations.

That judgment is discretionary, however. In an appropriate case it will be open to a manufacturer to attempt to convince EPA that there are indeed significant differences in emission performance between vehicles of the same configuration produced at different plants. By the same token, the regulations also provide that where EPA has reason to believe that cars of a given configuration produced at the "home plant" are not representative of cars of that configuration produced at other locations, testing at those other locations may also be required.

ii. *Random selection.* The original SEA proposal required vehicles for testing to be selected from each batch by statistical methods designed to ensure randomness. The manufacturers objected to this approach, arguing that the normal process of assembly has a sufficient randomizing effect on vehicle production, and that any additional measures would be costly and unnecessary. F. Comm. I–8, II–12–14; GM. Comm. IX 5–9.

This comment has been accepted, and the regulations have been amended accordingly. However, EPA retains the right to require true statistical random selection procedures where it has reason to suspect that the assembly process alone does not have sufficient randomizing influence.

iii. *"Continuous" sampling v. "batch" sampling.* It is a premise of "batch" sampling as proposed for use in SEA that cars produced during any one period of time are representative of cars produced at other periods of time, so that results obtained from testing vehicles at the time the sample is taken may be legitimately extrapolated to predict the performance of vehicles to be produced later in the model year.

Initially, most major domestic manufacturers supported this assumption. Tr. I–71 (GM); Tr. II–50–51 (AMC); C. Comm. 19, App. D pp. 2–3 (objecting to batch sampling on grounds other than statistical validity). See also GM. Comm. IX–9. Chrysler at the hearing later stated that production runs were not homogeneous and that continuous sampling was therefore required. C. Statement pp. 2–3. Tr. II–205. Ford, in its proposed sampling plan, adopted batch sampling, necessarily assuming homogeniety. F. Comm. App. D.

Such a record provides no firm basis for concluding that auto production is not homogeneous. In view of the much smaller expense of batch sampling for the same enforcement benefit, that approach has accordingly been retained.

iv. *Retests.* A certain degree of variation in results is inherent in the current emission testing procedure. For this reason, and also because of a belief on the part of some manufacturers that the first emission test performed on a relatively new vehicle may give results biased toward the high side, the manufacturers requested a right to retest vehicles in the SEA sample that failed the emissions test.

Allowing only failing vehicles to be retested would obviously bias the results of the total test program. However, there seems to be no objection to allowing retests if all vehicles in the sample are retested. The final regulations have been amended to permit that. In order to preclude statistical bias when retests are conducted, the individual test results for each vehicle will be averaged. See Tr. I–108, (GM) II–69 (AMC); II–104–105 (Ford).

5. TESTING PROCEDURES

i. *The use of deterioration factors.* As noted above, the SEA proposal provided that the anticipated deterioration in emission control performance between the test mileage and the statutory vehicle "useful life" of 50,000 miles would be accounted for by adjusting the standards. This would be done by applying two deterioration factors, one for the deterioration up to 4,000 miles, which would be calculated specially for SEA, and the other for the deterioration between 4,000 and 50,000 miles, which would simply be the deterioration factor demonstrated by the most closely related certification cars over that distance.

The manufacturers in their comments by and large attacked the use of any deterioration factor at all. Their suggestions regarding the 0–4,000 mile deterioration factor have been almost completely accepted; their objections to the use of the certification deterioration factor between 4,000 and 50,000 miles have not.

a. *The 0–4,000 mile deterioration factor.* Manufacturers objected to this adjustment on several grounds. They asserted that not enough data would be available in advance to calculate it meaningfully; that a large number of extra vehicles would have to be tested to determine what it was, since emission test results on relatively new cars tend to fluctuate widely; and that one alternative suggested by EPA—running the actual vehicles being tested to 4,000 miles and thus eliminating the need for any estimate of deterioration over that distance—was unacceptable because it would take too long, cost too much, and make it impossible to sell the vehicles concerned as new cars. The manufacturers also questioned whether there really was any deterioration in emission control performance over this distance. C. Comm. 12–13; F. Comm. I–4–5, II–30–3, App. C:; GM Comm. VII–A, VII–B, Tr. II–18–20, 34, 38 (AMC).

As an alternative to EPA's proposal, the manufacturers all made basically the same suggestion—that they be allowed to accumulate on the cars selected for testing as many miles as they thought necessary to stabilize emissions, and that the results so measured be treated as the 4,000 mile results. See GM Comm. VIII, Tr. II–36–32, 42 (AMC); Tr. II–94 (Ford); Tr. II–215–216 (Chrysler). This suggestion necessarily assumes that there will not be any significant change in emission control performance between the point at which the manufacturer tests the car, which all those addressing the point said they would try to hold to under 50 miles, and the 4,000 mile point.

In response to these comments, EPA has continued its evaluation of the performance of cars between 0 and 4,000 miles, using public data obtained during the comment period. On the basis of that analysis, the Agency has been unable to conclude that there is a statistically significant difference between zero mile and 4000 miles emissions. Therefore, the 0–4,000 mile deterioration factor has been eliminated. See report by Research Triangle Institute, January 1975.

The original proposal also permitted (though it did not require) manufacturers to accumulate mileage on their vehicles before testing. However, it required this mileage to be put on each car at a minimum rate of 500 miles per day, and only by use of the driving cycle used in certification durability testing.

Volkswagen objected to these requirements as unrealistic for many assembly plants, since the personnel to drive the cars long hours may not be available and the roads in the vicinity of the plant may make it difficult to follow the durability cycle exactly. Tr. I–172; I–207–211. See also N. Comm. p. 1; GM Comm. § 85.609 pp. 6–7.

These comments have merit, particularly since, with the abandonment of a 0–4,000 mile deterioration adjustment, cars will be driven only for purposes of stabilizing the engine. Corresponding changes have therefore been made to the final version of the regulations.

b. *The 4,000–50,000 mile deterioration factor.* All manufacturers that took a major part in the rulemaking, except Ford, also objected to the use of the deterioration factor derived from certification cars for use in SEA. They argued that one certification car run for 50,000 miles was too small a sample to be statistically meaningful, and that certification mileage accumulation, which because of time constraints must take place in a few months of continuous summer driving with specified fuel composition over a relatively small range of road conditions, might not reflect the actual use of production vehicles closely enough to make the deterioration factors comparable. C. Comm. 11–12, 14, Appendix B; GM Comm. III–13–17, III–23, VII–A; Tr. I–21 (GM); Tr. I–168–69 (VW); Tr. II–6 (AMC); DB, Comm. 4–6.

Ford, however, believed that the certification deterioration factor could be used for SEA, if two changes were made to it in the interest of technical accuracy. These were the use of an "additive" deterioration factor and the acceptance at face value of deterioration factors less than one. F. Comm. pp. I–5, II–32–33.

These criticisms have some validity. Nevertheless, the use of certification deterioration factors in SEA is being retained for several reasons.

First, no manufacturer denied that cars may well deteriorate in emission control performance over their first 50,000 miles, particularly for catalyst equipped vehicles, which are becoming increasingly prevalent. Tr. I–22 (GM); Tr. II–9–10 (AMC), II–105–106 (Ford), II–222 (Chrysler). When asked for an estimate of how to account for this deterioration in SEA, other than by using the certification deterioration factor, no satisfactory answer could be given. Tr. I–24–27 (GM); I–90 (VW); Tr. II–9–14 (AMC).[5]

Second, certification durability testing, though necessarily imperfect, is the best way we have of approximating how vehicles will perform in use. The driving cycle used has been deliberately set up to approximate actual in-use conditions as closely as possible. Until vehicles have actually been in customer use for several years, and their performance measured, the certification deterioration factor is the closest approximation to behavior in actual use that is available. See F. Comm. p. II–16; Tr. II–114 (Ford).

Finally, the statistical reliability of the deterioration factor generated in certification can always be improved to any desired extent at the manufacturer's option. The applicable regulations, see 40 CFR 86.077–24(c)(1)(ii), allow any number of indentical cars that the manufacturer wishes to be used to generate the 4–50,000 mile deterioration factor for each engine family. Accordingly, it is in the manufacturers' power to reduce the chances of statistical error based on testing a small number of vehicles to any extent chosen.

Although these regulations do not offer any alternatives to using certification DF's, it is the Agency's intention to give further consideration to this issue. In this respect, EPA encourages manufacturers to continue examining methods for taking deterioration into account when conducting assembly line testing to assure that vehicles continue to comply with the emission standards in use. At such time as manufacturers are able to present to EPA acceptable alternatives, EPA will consider amending these regulations to incorporate them.

With regard to additive deterioration factors, they are presently being considered for use in the certification regulations. At such time as the certification regulations are amended to permit their use, they will be considered for use with SEA.

ii. *Other comments regarding testing procedures*—a. *Separate publication.* In the SEA proposal, no test procedure especially intended for use in SEA was published. Instead, the test procedure by which the standards are defined, and which is used in certification, was cross-referenced, and it was stated that this would be used.

No serious objection was raised to the use of this test procedure. Several manufacturers commented, however, that these procedures should be published separately for application to SEA, since all the details of their application in certification might not be appropriate in this different context. GM Comm. III–23–26, Tr. I–93–94, 94–98 (GM); Tr. T–171, (VW); Tr. II–101, 162 (Ford). Lists were submitted to indicate the portions that, in the manufacturers' judgment, might be dropped or amended.

This comment has been adopted. Though the test procedures to be used are basically those that apply in certification, a number of the manufacturers' suggestions for detailed changes have been accepted.

b. *Lack of correlation.* A number of manufacturers objected to the provision in the proposed regulations which would allow the Administrator to suspend a certificate of conformity if a determination was made that a lack of correlation exists between the manufacturer's test equipment and the test equipment used by the Administrator. This provision is deleted in the final regulations. However, the term lack of correlation has been changed to lack of agreement to emphasize that differences in test results between EPA and a manufacturer may be the basis for suspension if EPA's testing results indicate the configuration in question is not in compliance. The two sets of data could correlate perfectly in the mathematical sense, yet one could be a multiple of the other, for example, and the data would not agree.

c. *Miscellaneous changes.* Since vehicles will normally receive predelivery checks prior to delivery to the user, permitting such checks for SEA would not make them unrepresentative of vehicles to be driven in actual use. Therefore, the final regulations permit predelivery checks.

Those comments dealing with the daily testing requirement centered around the problem of SEA testing conflicting with other testing requirements. Where a manufacturer believes that he cannot comply with the daily testing requirement because of other commitments, a mechanism has been provided in the regulations for dealing with this problem. A manufacturer may apply to the Administrator for an exception to the testing requirement prior to or after receipt of a test order.

6. OTHER CHANGES FROM THE PROPOSAL

i. *Suspension of certificate of conformity for vehicles belonging to a rejected batch.* The proposal stated that "The certificate of conformity is suspended with respect to those vehicles which belong to a rejected batch and are still in the hands of the manufacturer * * *". This provision has been deleted because there is no sound statistical basis for doing this. The determination as to whether the configuration being audited meets the 40 percent AQL cannot be made until the batch sequence has either been accepted or rejected. Rejection of an individual batch does not necessarily mean that more than 40 percent of the vehicles are not complying.

ii. *Suspension of certificate of conformity when batch sequence is not accepted.* In order to emphasize that the Administrator has discretion in determining whether a certificate should be suspended in the event a manufacturer fails an audit, the language in this provision has been changed from that in the proposal to indicate that the Administrator may suspend the certificate rather than will suspend the certificate. This change has been made to make it clear that failure of an audit will not automatically result in suspension of the certificate.

iii. *Procedures for approving SEA-related engineering changes.* When a vehicle configuration fails to comply with SEA, and permission to sell it is therefore suspended or revoked, the manufacturer may have to make engineering changes to the vehicle to bring it back into conformity. The current EPA procedure for approving such changes (called "running changes") can be time-consuming. Up to now such delays have not had drastic consequences, since the manufacturer has been free to manufacture and sell vehicles of the previous design prior to approval of the changes. Under SEA, however, the assembly of the configuration affected may be discontinued until the change is approved.

The certification regulations require that a manufacturer notify EPA of any intended changes to a vehicle covered by certification where the manufacturer believes that the changes will require testing to demonstrate that the vehicle is still in conformance with the conditions for issuance of a certificate of conformity. Prior to approval of the changes, EPA may require the manufacturer to perform appropriate testing. Since by definition any engineering change made to a vehicle configuration subsequent to revocation of the certificate is one that will require conformity testing, the manufacturer must notify EPA prior to implementing the change. These regulations state that the testing performed in connection with the post-failure SEA audit fulfills all "running change" testing requirements provided that the change is one that will not affect durability of the emission control system. This provision has been included in the regulations because EPA has determined that testing performed for the audit would provide adequate information to determine the compliance of the configuration in question. GM Comm. IX–14–15; Tr. 112–115 (GM); Tr. I–173, 1–203–07 (VW); Tr. II–101–2, 195–6 (Ford). Changes affect-

[5] At the July hearing, Chrysler suggested that a more reliable deterioration factor could be developed by averaging deterioration factors across engine families with similar control systems. Tr. II–225. Ford rejected this approach, arguing that differences in emission performance between engine families are significant enough that it is not appropriate to average deterioration factors. Tr. II–119. An investigation by the Agency indicates that the factor which may have the greatest effect on different deterioration rates, catalyst size, varies widely between the different engine families of a given manufacturer. Therefore, averaging deterioration factors may mask true differences, rather than focusing in on an actual underlying deterioration rate.

ing durability will be handled through the usual "running change" procedure.

iv. *Limiting test orders.* One of the characteristics of the proposed SEA program most strongly objected to by the manufacturers was the lack of any limit on the number of test orders that could be issued to a given auto company. This, it was claimed, made the ultimate administrative and economic burden imposed by the program impossible to predict. C. Comm. 22–23; Appendices C and F; Tr. I–14 (GM); II–5 (AMC).

In response to this concern, and prompted by a suggestion made by Ford in its initial comments, F. Comm. I–7; II–5–6 (see also T. Comm. 10), EPA at the hearing raised the question whether setting an upper limit based on production volume to the number of test orders to be issued to each manufacturer would be an acceptable approach. Numbers approximating those yielded by a rate of one test order per 300,000 cars annual production, with a minimum of one, were mentioned. The general response was that both the approach and the specific number suggested were not open to serious objection. Tr. I–78–79 (GM); II–60–62, 79 (AMC); II–175, 194–95 (Ford).

This approach has been adopted in the final regulations, with two qualifications. First, test orders that result in a determination that a given configuration is not meeting the AQL will not be counted against the ceiling. The purpose of SEA is to provide an incentive to manufacturers to meet the AQL. As long as that incentive is working only limited testing will be necessary. But if it is not, further examination may be required, both to provide an inducement to the manufacturer to tighten up quality control and to determine the exact extent of the nonconformities. See Tr. II–202–203.

Second, the ceiling may be exceeded by EPA in cases where all test orders for a given manufacturer have been used up and the Agency has received information indicating that a violation of AQL limits is probably occurring. In such cases, an additional test order could be issued.

This second exception from the ceiling is intended to be used hopefully only in rare cases, where evidence in EPA's possession gives definite cause for concern.

It should be noted, however, that no such "probable cause" requirement applies to EPA issuance of orders within the testing limit. As discussed above, the effectiveness of SEA depends in part on the auto companies being unable to predict which of their configurations will be selected for testing. It is intended, therefore, that within that limit EPA have the maximum discretion allowed by law in the issuance of these orders.

A closely related point concerns the effect to be given a manufacturer's own quality control program in implementing SEA. It is a key part of the philosophy of SEA to encourage manufacturers to develop their own adequate quality control and monitoring programs. SEA will serve simply as a spot check on how well those programs are working. To the extent that a manufacturer's program is confirmed by SEA to be yielding vehicles which meet emission standards by comfortable margins, it may be possible to reduce the number of SEA orders accordingly.

In their comments, manufacturers asked to be told the exact type of quality control system that would be acceptable to EPA so as to eliminate or minimize the issuance of SEA test orders. GM Comm. III–27–28, IX 12–14; Tr. II–92 (Ford). SEA is not intended to be a quality control measure but rather is an audit tool used to determine whether the manufacturer has an effective production system. As can be seen by the approaches taken by GM, Ford and Chrysler (each presented radically different approaches with significantly different costs in their submissions to the SEA rulemaking record), each manufacturer has a different idea as to what may be appropriate to assure the performance quality of his vehicles. It is EPA's judgment that the manufacturer is in the best position to know the quality assurance system he should use and that EPA should use a uniform and economical method to audit the effectiveness of such systems. This is what SEA is intended to do.

Accordingly, EPA will not specify any guidelines for manufacturers' programs. Instead, these programs will be evaluated on an ad hoc basis in the course of deciding whether or not to issue individual test orders at least for the present.

v. *Administrative.* The proposed regulations required manufacturers to make daily telephone reports and submit daily written reports of test results. These requirements have been deleted from the final regulations because it has been determined that the final report provides all of the information needed by the Administrator to determine whether a manufacturer has complied with all of the provisions of this subpart and the test order.

Several foreign manufacturers proposed that EPA provide thirty to sixty days notice of issuance of a test order. EPA maintains that in order for SEA to be an effective deterrent to producing noncomplying vehicles, it must be able to require that production vehicles be tested with little or no notice. This will assure that representative samples of vehicles are selected for testing. EPA concurs with a number of manufacturers who recommended that test orders be issued to the authorized representative who signs the Application for Certification and the Agency has changed the regulations accordingly.

A provision has been added to the final regulations which would permit a manufacturer to reintroduce into commerce, prior to full reinstatement of the certificate, a configuration which has had its certificate suspended or revoked. This may be permitted when the manufacturer has developed a quality control or engineering change and is ready to implement it and conduct an audit to demonstrate that the configuration is in compliance. The purpose of this provision is to preclude manufacturers having to store entire batches of vehicles while conducting a subsequent audit. Otherwise this would be necessary while a certificate remained suspended or revoked until such time as the vehicle configuration being tested passed the audit.

vi. *Effective date.* The proposed regulations would have gone into full effect in the 1976 model year. All the manufacturers claimed that such early implementation was flatly impossible. C. Comm. I–6–7, Tr. I–136 (GM). In part, this position was based on the stringency of the 10 percent AQL originally proposed, but the auto companies maintained that position even after the possibility of a more lenient AQL was suggested to them at the hearing.

On the other hand, several of the companies did express their willingness to conduct SEA in 1976 on a "pilot" basis, meaning that only a limited number of test orders would be issued and no penalties for audit failure would be imposed. Tr. I–137 (GM); II–73 (AMC). This approach has been adopted in the final regulations.

Three manufacturers suggested 1978 as the earliest possible date for full-scale implementation of SEA, Tr. II–257 (Chrysler) and two thought that it could take place in 1977. Tr. 1–140; (GM indicates no technical objection to 1977 effective date) Tr. I–214 (VW), Tr. II–67 (AMC) Tr. II–102 (Ford). A 1977 deadline has been set for full implementation of SEA. Since the 40 percent AQL closely approximates "averaging," and since all the auto companies claimed that they met standards already if "averaging" were permitted, there seems no reason to delay institution of a program designed to confirm that fact longer than is needed to set up and test the administrative machinery. In fact, according to EPA's analysis of the data submitted during this rulemaking, engine families representing approximately 94 percent of the 1976 vehicles for which manufacturers have provided data were complying in the 1976 model year with a 40 percent AQL. Of course, the emission standards for 1977 are almost identical (the only change being for NOx, from 3.1 to 2.0 grams/mile) to those for 1976.

IV. Economic Impact

Though all manufacturers addressing the point claimed that implementing SEA at the 10 percent AQL originally proposed would have severe adverse effects on price and fuel economy, and hence on auto sales and employment, there is no reason to believe that a 40 percent AQL will have any major adverse effects. A study prepared by EPA's Office of Planning and Evaluation demonstrates that point. "Economic Analysis of the Selective Enforcement Auditing (SEA) Regulations," Office of Planning and Evaluation, Environmental Protection Agency, December 22, 1975.

According to that study, which accepts virtually at face value the collective assertions of the manufacturers, no loss in fuel economy will result from a

40 percent AQL at the level of these standards. The average sticker price increase will be $11, or two-tenths of one percent. See "Economic Analysis," Table 5. The resulting reduction in auto sales is estimated at 9,000 cars in 1977, or less than one-tenth of one percent. "Economic Analysis," Table 24.

Analysis of the 1976 model year emission data submitted by manufacturers after preparation of the above economic analysis, which shows a significant improvement over 1975 emissions performance, has resulted in a considerable downgrading of the expected cost increase due to a 40 percent AQL. EPA's latest estimate for the average increase in sticker price now ranges from $.17 to $.70.

The administrative cost to the manufacturers of carrying out the program will be similarly low. Only one manufacturer—Ford—estimated that any additional capital investment would be required if EPA were to accept a ceiling on the number of test orders to be issued annually. "Economic Analysis," Table 12. Additional operating costs will of course be incurred as the manufacturers carry out the additional emission testing that SEA will require, but even at the extreme this cost will not exceed about one and a half million dollars a year, and half a million is a more likely high estimate. "Economic Analysis," Table 14. Total domestic sales of the domestic auto companies are in the neighborhood of fifty billion dollars a year. "Economic Analysis," Table 21.

It is conceivable that the altogether negligible impact of SEA at the level of the 1977 standards will increase in future model years as the standards are tightened, but since the manufacturers did not provide any data on that point, no detailed analysis of it could be made. Several points, however, are worth noting.

First, as long as a 40 percent AQL continues to approximate "averaging," no extra burden over and above either certification or what the auto companies concede is justified for an assembly line test will be imposed by SEA. The only reason why a 40 percent AQL might not continue to approximate "averaging" at lower emission levels is that the shape of the distribution of emission results might change. However, since lower standards will increase the forces "skewing" the distribution to the high side, the only likely change in shape is to a distribution even more "skewed" to the high side than at present. As discussed above, the more "skewed" the distribution, the lower the AQL must be to approximate "averaging." There is some reason to believe, therefore, that as long as the 40 percent AQL is not changed, SEA will be more lenient than "averaging" in future model years.

Second, it is generally agreed that the emissions test to be used in SEA suffers from some variability in results from test to test. As standards become lower, the relative influence of this random error on each individual emission measurement will increase. Two factors, however, will greatly diminish its impact on the final determination whether a configuration is in compliance with SEA or not. The first is the provision for retesting vehicles at the manufacturer's option that has been inserted into the regulations at their request. The second is the 40 percent AQL itself. Since this AQL allows almost half the cars to exceed the standards, and since the variation in emission measurements from test to test is essentially random (see Society of Automotive Engineers Paper No. 741035, p. 2), testing errors that cause vehicles to fail which would otherwise have passed will tend to be offset by errors that cause vehicles to pass which would otherwise have failed.

Finally, it is worth noting that some data exists to show that at the level of the current California standards, SEA will not impose much more of a burden than it will at the current Federal level. At present, 79 percent of California cars would meet SEA at a 40 percent AQL, as compared to 80 percent of Federal cars. "Economic Analysis," Table 7. Although the level of auto emission standards after 1977 has of course not been determined yet, the current version of the House bill would not require control more stringent than the current California standards until 1980, while the current version of the Senate bill would continue the 1977 national standards until 1980. It appears, then, that until the 1980 model year at the earliest, the economic burdens associated with SEA at the 40 percent AQL will be minimal.

V. Legal Aspects

The manufacturers challenged, in several respects, EPA's legal authority to promulgate the SEA regulations. These comments fall into four categories: The concept of averaging, the potential need for reproposal, hearing procedures, and enforcement provisions.

1. "AVERAGING"

The most pervasive legal question raised in the course of this rulemaking was whether the Clean Air Act contemplates that each vehicle coming off the assembly line will meet the same emission standards that applied in certification, or whether it is only necessary for those standards to be attained on the average basis by a population of production vehicles. Manufacturers who expressed an opinion unanimously supported the averaging position. However, that position is, as I am advised by my General Counsel, inconsistent with the requirement of the Act that every vehicle be warranted to meet the emission standards.

Under the current testing plan, with the AQL for a class of vehicles set at 40 percent, the practical differences between these two approaches may not be that great. It was generally agreed during the rulemaking that SEA with a 40 percent AQL and "averaging" pure and simple will be very similar in their immediate effects on the manufacturers Tr. 1–120 (GM); II–81 (AMC). Any future change of the AQL will depend on a need for such change as demonstrated by assembly line data to be acquired under this program.

2. THE ASSERTED NEED FOR REPROPOSAL

Several manufacturers claimed that if EPA were to make any significant changes from the proposed version of the regulations, it would have to propose them again for comment.

The law is otherwise. The Administrative Procedure Act does not require precise notice of the terms of the final rule to be given in the proposal. It requires instead that notice of "either the terms or substance of the proposed rule notice of "either the terms or substance of the proposed rule or a description of the subjects and issues involved" shall be given. 5 U.S.C. 553(b)(3). The legislative history adds that the notice "must be sufficient to fairly apprise interested parties of the issues involved, so that they may present responsive data or arguments relating thereto." "Administrative Procedure Act—Legislative History," S. Doc. No. 248, 79th Cong. 2d. Sess. 200 (quoting from Senate Report). See also id. at 258 (quoting from House Report) (1946). The decisions on this point are to much the same effect. They also add the principle that an agency may change its proposed rule in response to comments received, since otherwise the comment period required by the statute would be of no practical effect.

The record of this rulemaking indicates that EPA fully complied with these legal requirements. Eleven of the thirteen changes (other than minor technical or drafting changes) made to the final version of the regulations were made in response to specific comments of the automobile manufacturers who made up the only class of interested persons to participate in the rulemaking in any significant way. These were the deletion of the requirement for taking account of deterioration between 0 and 4,000 miles, an expedited procedure for approving engineering changes related to SEA, a change in the effective date of the program, specific adaptation to SEA of the certification test procedures, allowing retests on cars in SEA samples, relaxing the procedures for mileage accumulation on cars in SEA samples, setting a limit to the number of test orders to be issued to a given manufacturer in any given model year, allowing the manufacturer to specify the assembly plant at which vehicles of a given configuration should be tested, relaxation of the requirements that sample cars be selected by random methods from designated batches, and deletion from the hearing regulations of any provision for third-party intervention. Specific notice was given in the hearing announcement on June that the first four of these items might be changed, and possible changes to all but the last two were discussed at the hearing. All these changes, it will be evident, concerned somewhat technical details of the implementation of the program.

The only two changes which could be called significant by any stretch of the

imagination which were made to the final version of the regulations other than at the specific request of a party commenting are the adoption of a revised sampling plan and the adjustment of the AQL from 10 percent to 40 percent.

The revised sampling plan, however, was made publicly available prior to the announcement of the July hearing and comments on it were received for thirty days after the hearing closed, for a total of sixty days comment in all. Detailed comments on it were in fact received.

As for the change in the AQL, the possibility that this might be done was clearly announced at the time of proposal in these words:

> [G]iven that the program proposed here is new, it may be desirable to initiate the program with a higher AQL (than 10 percent), to be reduced to the goal of 10 percent in future years after some experience with the program is gained * * *. Comment is specifically solicited on the level of the initial AQL and the schedule for meeting the ultimate goal of 10 percent. 39 FR 45363 (Dec. 31, 1974).

By any normal standards, this statement would be sufficient to give notice that a considerably higher AQL than ten percent might be adopted in the final promulgation.[10]

In addition, in the hearing notice EPA renewed its call for comment on alternative AQL's, and the question of a 40 percent AQL was specifically raised repeatedly at the hearing. Tr. I–119, 126, 147 (GM); I–193, 212, 222 (VW); II–81 (AMC); II–167 (Ford); II–239 (Chrysler). Indeed, the same question was discussed in January 1975, in EPA's hearing on suspension of the 1977 auto emission standards. See 1977 Suspension Hearing Transcript, p. 159.

Beyond these specifics, the auto manufacturers had every reason based on the logic of their position to give their opinion of an AQL in the neighborhood of 40 percent. As discussed above, it was their position that "averaging" was required for assembly line testing for both legal and practical reasons. Given the force with which they pushed that point, they certainly might have envisioned that EPA would take account of their comments in the most direct way, by adjusting the AQL upward.

In fact, a significant amount of data and opinion concerning a 40 percent AQL did emerge in the course of this rulemaking, enough to amply support the conclusions EPA has drawn concerning it. That data has been discussed above. A fair reading of the record will suggest that the absence of more detailed comment on this obvious potential modification to the proposed scheme stems from a tactical judgment on the part of the auto companies. Rather than suggest ways in which the AQL in the proposal could be modified to become more acceptable, they concentrated in attacking the whole AQL approach, which they perceived to be inconsistent with the "averaging" position to which they were committed. This was, of course, their right. But their choice of this approach does not point to any deficiency in the rulemaking. The APA requires that a fair opportunity for comment be given; it does not require that opportunity to be exercised. The choice whether to exercise it or not is up to the persons potentially affected.

[10] Indeed, even prior to any SEA proposal, when alternative programs were being discussed informally between EPA and the industry, Ford submitted a detailed analysis of the potential consequences of a 40 percent AQL. "Selective Enforcement Auditing Discussion Ford-EPA, November 12, 1974" (discussion book prepared by Ford Motor Company). Exhibits II and IV.

3. HEARING PROCEDURES

The manufacturers challenged provisions of § 85.614(d) of the proposed regulations which permitted the Agency to deny a manufacturer's request for a hearing if it appeared that "there is no genuine and substantial question of fact" with respect to the relevant issues. The manufacturers argue that this provision is inconsistent with the mandatory language of section 206(b)(1)(B)(i) of the Act to the effect that "[t]he Administrator *shall* grant such manufacturer a hearing * * *" [Emphasis added.] As noted in the preamble to the proposed SEA regulations, the concept of an administrative summary judgment, even in the face of statutory language as above, is now well established. See, e.g., *"Weinberger* v. *Hynson, Westcott and Dunning Inc."* 412 U.S. 609 (1973). It is true, however, that this line of cases requires that the relevant issues for the hearing be specified clearly in advance in the regulations. Although section 206(b)(2)(B)(i) of the Act already narrows the issues for SEA enforcement hearings, the final rules further clarify the issues by providing that the validity of previously promulgated testing and sampling regulations will not be an issue in such hearings, where preenforcement judicial review of the rules is available.

The hearing procedures were shortened by the deletion of provisions for intervention contained in the proposal. Even the short delay contemplated by the proposal could cause substantial injury to the affected manufacturer and his employees. Furthermore, the benefits gained by permitting intervention in such hearings seem marginal at best. It seems highly improbable that any potential intervenor would be able to make a meaningful contribution to the narrow issues of the actual conduct of testing and sampling. The unlikelihood that anyone with a genuine interest not adequately represented by existing parties would seek intervenor status must be balanced against the injury to the manufacturer, his employees, and the public, resulting from each day's delay. We conclude that providing a time period for submission of intervenor petitions is unjustified.

Rules of other Federal agencies limit the right to intervene in agency proceedings in circumstances similar to SEA hearings. See e.g., 14 CFR 302.15, 16 CFR 3.4, 18 CFR 1.8, 47 CFR 1.223 (1974 ed.). The Administrative Conference of the United States has recommended that

> [p]ublic participation in enforcement proceedings, license revocations or other adjudications where the issue is whether the charged respondent has violated a settled law or policy should be permitted only after close scrutiny of the effect of intervention or other participation on existing parties.[11]

Similarly, the provision for interlocutory appeals to the Administrator were deleted. Due to the anticipated brevity of the hearings themselves, they would likely be completed prior to the decision on an interlocutory appeal. For hearings on non-test-related suspensions where the certificate remains in effect prior to the decision at the hearing, interlocutory appeals could be used as a delaying tactic. The main purpose of interlocutory appeals, expediting the ultimate resolution of a dispute, is not served by allowing such appeals in the context of SEA enforcement hearings.

The procedures were further shortened by a general reduction of most time periods. The time periods for nontest-related suspension hearings were shortened to make them more consistent with the hearings on test-related suspensions. Under the proposed rules, a decision in the former type of hearings could well be delayed past the end of a model year, thus mooting the case.

4. ENFORCEMENT PROVISIONS

The manufacturers deny EPA's right to prevent counsel from representing more than one person in an SEA investigation. Without deciding the matter, the Agency has concluded that the American Bar Association Code of Professional Responsibility (DR 5–105(A), 1974 Amendments) adequately protects against the abuses which the regulation was designed to prevent. Therefore, the provision was deleted.

General Motors argues that EPA lacks the legal authority to compel manufacturers to conduct SEA testing. They base this contention on the language of section 206(b)(1), of the Act, which provides that testing of new production vehicles "may be conducted by the Administrator directly or, in accordance with conditions specified by the Administrator, by the manufacturer." General Motors interprets the word "may" to mean that the manufacturer can conduct tests at his option. The Acts legislative history, however, believes this interpretation. The Conference Report states that the Administrator "may test (or prescribe test to be performed by the manufacturer) all or a sample of vehicles or engines on the assembly line" to determine compliance. H.R. Rep. No. 91–1783, 91st Cong. 2d Sess. 50–51 (1970). See also 116 Cong. Rec. H5355 (June 10, 1970), where Congressman Jarman, discussing the same language in House bill H.R.

[11] For two studies discussing and supporting this point of view, see Cramton, "The Why, Where and How of Broadened Public Participation in the Administrative Process," 60 Geo. L.J. 525 (1972); Gellhorn, "Public Participation in Administrative Proceedings," 81 Yale L.J. 159 (1972).

17255, stated that the Administrator "is authorized and directed to test, or require to be tested in such manner as he deems appropriate, any new motor vehicle * * *." EPA concludes, therefore, that the word "may" was used to grant the Administrator discretion to either conduct tests himself or to have the manufacturer test for him.

The issue of whether EPA has the authority to conduct unannounced, warrantless inspections was discussed previously in the preamble to the February 27, 1974, amendments to the motor vehicle certification procedures published in 39 FR 7545. That discussion is applicable to SEA as well.

Similarly, the manufacturers' arguments challenging EPA's right of access to records and facilities relating to emission testing and performance and disputing EPA's authority to revoke certificates for reasons other than failing emission tests were discussed in the February 27, 1974, preamble, and no further discussion is necessary here. These provisions were retained.

The proposed rules provided that a certificate of conformity could be revoked if a manufacturer "renders inaccurate or invalid any test data * * * or otherwise circumvents the intent of the Act or of this subpart * * *." The manufacturers objected to this provision on the grounds that it was unnecessary and unduly vague. Since it appears that the "or invalid" and "circumvention" language is duplicative of other language in the rules, those phrases were deleted. Nevertheless, it remains the Agency's position that certificates may be suspended or revoked if a manufacturer intentionally invalidates test data or equipment or employs any scheme designed to mask the true emissions performance of the vehicles he offers for sale. The remedies under section 113(c)(2) would be applicable for any knowing violations of these provisions.

VI. Environmental Impact Statement Requirements

No voluntary environmental impact statement has been prepared pursuant to EPA guidelines set forth in 39 FR 37419. SEA is primarily directed at light duty vehicles, whose emission standards are specifically exempted from the EIS requirements. Section 1(c)(1)(E). Furthermore, SEA is neither an "emission standard under section 202" of the Clean Air Act, nor a change in measuring technique for those standards. Section 1(a)(2). Nevertheless, the only conceivable adverse environmental effect resulting from implementation of SEA, increased sulfate emissions, is expected to be minimal. For the reasons set forth in the economic analysis previously referred to, the 40 percent AQL will not force many vehicle configurations across a hardware threshold which would produce additional sulfates, particularly as the standards themselves and demand for fuel economy improvements result in nearly universal use of catalysts.

These regulations are issued under authority of the following sections of the Clean Air Act, as amended: 206 Sec. 206. 79 Stat. 994, as amended by section 8(a), 84 Stat. 1694 (42 U.S.C. 1857f–5); 208 sec. 208, 79 Stat. 994, 42 U.S.C. 1857f–6; and 301(a) sec. 301(a), 81 Stat. 504, as amended by sec. 15(c), 84 Stat. 1713 (42 U.S.C. 1857g(a)). The regulations implement section 206(b) and section 208 of the Clean Air Act.

RUSSELL E. TRAIN,
Administrator.

JULY 20, 1976.

Chapter I of Title 40 of the Code of Federal Regulations is amended as follows:

1. Paragraph (b) of § 86.077–2 of Part 86 is amended by the addition of:

§ 86.077–2 Definitions.

* * * * *

(b) * * *

"Configuration" means a subclassification of an engine-system combination on the basis of engine code, inertia weight class, transmission type and gear ratios, rear axle ratio, and other parameters which may be designated by the Administrator.

(Secs. 206, 208 301(a), Clean Air Act, as amended (42 U.S.C. 1857f–5, 1857f–6, and 1857g(a)).)

2. Paragraph (a)(2) of § 86.077–30 of Part 86 is amended by changing the last sentence to read as follows, and paragraph (d) is added as follows:

§ 86.077–30 Certification.

(a)(1) * * *

(2) * * * It is also a term of this certificate that this certificate may be revoked or suspended for the other reasons stated in § 86.077–30 (c) or (d).

* * * * *

(d)(1) Notwithstanding the fact that any vehicle configuration or engine family may be covered by a valid outstanding certificate of conformity, the Administrator may suspend such outstanding certificate of conformity in whole or in part with respect to such vehicle configuration or engine family if:

(i) The manufacturer refuses to comply with the provisions of a test order issued by the Administrator pursuant to § 86.603; or

(ii) The manufacturer refuses to comply with any of the requirements of § 86.603; or

(iii) The manufacturer submits false or incomplete information in any report or information provided pursuant to the requirements of § 86.609; or

(iv) The manufacturer renders inaccurate any test data which he submits pursuant to § 86.609; or

(v) Any EPA Enforcement Officer is denied access to a facility on the terms specified in § 86.606.

(vi) Any EPA Enforcement Officer is denied the opportunity on the terms specified in § 86.606 to

(A) Monitor vehicle selection pursuant to § 86.607,

(B) Select vehicles for testing pursuant to § 86.607, or

(C) Monitor vehicle testing performed to satisfy any of the requirements of this part; or

(vii) Any EPA Enforcement Officer is denied "reasonable assistance" as defined in § 86.606 is examining any of the items listed in that section; or

(viii) The manufacturer refuses to comply with the requirements of §§ 86.604(a), 86.605, 86.607, 86.608, 86.610, or 86.611.

(2) The sanction of suspending a certificate may not be imposed for the reasons in paragraphs (d)(1) (i), (ii) or (viii) of this section where such refusal is caused by conditions and circumstances outside the control of the manufacturer which renders it impossible to comply with those requirements. Such conditions and circumstances shall include, but are not limited to, any uncontrollable factors which result in the temporary unavailability of equipment and personnel needed to conduct the required tests, such as equipment breakdown or failure or illness of personnel, but shall not include failure of the manufacturer to adequately plan for and provide the equipment and personnel needed to conduct the tests. The manufacturer will bear the burden of establishing the presence of the conditions and circumstances required by this paragraph.

(3) The sanctions of suspending a certificate may be imposed for the reasons in paragraphs (d)(1) (iii), (iv), (v), (vi), (vii) of this section only when the infraction is substantial.

(4) In any case in which a manufacturer knowingly submitted false or inaccurate information or knowingly rendered inaccurate any test data or committed any other fraudulent acts, and such acts contributed substantially to the Administrator's original decision not to suspend or revoke a certificate of conformity in whole or in part, the Administrator may deem such certificate void from the date of such fraudulent act.

(5) In any case in which certification of a vehicle is proposed to be suspended under paragraph (d)(1)(v), (d)(1)(vi), or (d)(1)(vii) of this section, and in which the Administrator has presented to the manufacturer involved reasonable evidence that a violation of § 86.606 in fact occurred, the manufacturer, if he wishes to contend that, even though the violation occurred, the vehicle configuration or engine family in question was not involved in the violation to a degree that would warrant suspension of certification under either paragraph (d)(1)(v), (d)(1)(vi), or (d)(1)(vii) of this section, shall have the burden of establishing that contention to the satisfaction of the Administrator.

(6) Any suspension of certification under paragraph (d)(1) of this section shall:

(i) Be made only after the manufacturer concerned has been offered an opportunity for a hearing conducted in accordance with § 86.613 hereof and

(ii) Not apply to vehicles no longer in the hands of the manufacturer.

(Secs. 206, 208, 301(a), Clean Air Act, as amended (42 U.S.C. 1857f–5, 1857f–6, 1857g (a)).)

§ 86.077–7 [Amended]

3. The last sentence of paragraph (c)(7)(iv) of § 86.077–7 of Part 86 is deleted.

4. Paragraph (c)(1)(ii) of § 86.077–30 of Part 86 is revised to read as follows:

§ 86.077–30 Certification.

* * * * * * *

(c) * * *

(1) * * *

(ii) The manufacturer renders inaccurate any test data which he submits pertaining thereto.

5. Part 86 is amended by adding a new Subpart G as follows:

Subpart G—Selective Enforcement Auditing of New Gasoline Fueled and Diesel Light-Duty Vehicles and New Gasoline-Fueled and Diesel Light-Duty Trucks

Sec.

86.601 Applicability.
86.602 Definitions.
86.603 Test orders.
86.604 Testing by the Administrator.
86.605 Maintenance of records; submittal of information.
86.606 Entry and access.
86.607 Sample selection.
86.608 Test procedures.
86.609 Calculation and reporting of test results and low-mileage emissions targets.
86.610 Acceptance and rejection of batches.
86.611 Acceptance and rejection of batch sequence.
86.612 Suspension and revocation of certificates of conformity.
86.613 Hearings on suspension and revocation of certificates of conformity.

AUTHORITY: Secs. 206, 208, 301(a), Clean Air Act, as amended (42 U.S.C. 1857f–5, 1857f–6, 1857g(a)).

Subpart G—Selective Enforcement Auditing of New Gasoline-Fueled and Diesel Light-Duty Vehicles and New Gasoline-Fueled and Diesel Light-Duty Trucks

§ 86.601 Applicability.

For 1977 model year vehicles produced before January 1, 1977, the provisions of this subpart with the exception of §§ 86.612 and 86.613 are applicable to new gasoline-fueled light-duty motor vehicles, new diesel light-duty vehicles, new gasoline-fueled light-duty trucks, and new diesel light-duty trucks. For 1977 vehicles produced beginning January 1, 1977 and later model year vehicles, all provisions of this subpart are applicable.

§ 86.602 Definitions.

(a) As used in this subpart, all terms not defined herein or in Subpart A or B of this part shall have the meaning given them in the Act:

(1) "Acceptable Quality Level" (AQL) means the maximum percentage of failing vehicles that, for purposes of sampling inspection, can be considered satisfactory as a process average.

(2) "Batch" means the collection of vehicles of the same configuration, as designated by the Administrator in a test order, from which a batch sample is to be drawn and inspected to determine conformance with the acceptability criteria.

(3) "Batch Size" means the number, as designated by the Administrator in the test order, of vehicles of the same configuration in a batch.

(4) "Batch Sample" means the collection of vehicles of the same configuration which are drawn from a batch from which test samples are drawn.

(5) "Batch Sample Size" means the number of vehicles of the same configuration in a batch sample.

(6) "Test Sample" means the collection of vehicles of the same configuration which are drawn from the batch sample and which will receive exhaust emission tests.

(7) "Test Sample Size" means the number of vehicles of the same configuration in a test sample.

(8) "Inspection Criteria" means the acceptance and rejection numbers associated with a particular sampling plan.

(9) "Acceptance of a Batch" means that the number of noncomplying vehicles in the batch sample is less than or equal to the acceptance number as determined by the appropriate sampling plan.

(10) "Rejection of a Batch" means that the number of noncomplying vehicles in the batch sample is greater than or equal to the rejection number as determined by the appropriate sampling plan.

(11) "Acceptance of a Batch Sequence" means that the number of rejected batches in the sequence is less than or equal to the sequence acceptance number as determined by the appropriate sampling plan.

(12) "Rejection of a Batch Sequence" means that the number of rejected batches is equal to or greater than the sequence rejection number as determined by the appropriate sampling plan.

§ 86.603 Test orders.

(a) The Administrator will require any testing under this subpart by means of a test order addressed to the manufacturer.

(b) The test order will be signed by the Assistant Administrator for Enforcement or his designee. The test order will be delivered by an EPA Enforcement Officer or sent by registered mail, return receipt requested, to the authorized company representative of the manufacturer who signs the Application for Certification submitted by the manufacturer pursuant to the requirements of the applicable sections of Subpart A of this part.

(c) The test order will specify the vehicle configuration selected for testing, the manufacturer's plant or storage facility from which the vehicles must be selected, the time and location at which vehicles must be selected, the batch size and the manner in which vehicles must be selected from the batch. The test order may include an alternative configuration selected for testing in the event that vehicles of the first specified configuration are not available for testing because such vehicles are not being manufactured at the specified plant, not being manufactured during the specified time or not being stored at the specified plant or storage facility. In addition, the test order may include other directions or information essential to the administration of the required testing.

(d) A manufacturer may indicate preferred assembly plants for the various engine families produced by the manufacturer for selection of vehicles in response to a test order. This shall be accomplished by submitting a list of engine families and the corresponding assembly plants from which the manufacturer desires to have vehicles selected to the Administrator. In order that a manufacturer's preferred location for issuance of a test order for a configuration of a particular engine family be considered, the list must be submitted prior to issuance of the test order. Notwithstanding the fact that a manufacturer has submitted the above list, the Administrator may, upon making the determination that evidence exists indicating noncompliance at other than the manufacturer's preferred plant, order testing at such other plant where vehicles of the configuration specified in the test order are assembled.

(e) A manufacturer shall upon receipt of a test order proceed in accordance with the provisions of this subpart.

(f) The Administrator will not issue to a manufacturer during a given model year more test orders than an annual limit determined by dividing the projected sales for that year, as made by the manufacturer in his Application for Certification, by 300,000 and rounding to the nearest whole number unless the projected sales are less than 150,000 in which case the annual limit is one: Except, That the Administrator may issue one additional test order beyond the annual limit for each configuration for which the batch sequence is rejected in accordance with § 86.611 and when the annual limit, increased by such additional test orders, has been met, additional test orders may be issued for configurations for which evidence exists indicating noncompliance.

(g) Any test order under which testing is not completed will not be counted against the annual limit established in paragraph (f) of this section.

§ 86.604 Testing by the Administrator.

(a) The Administrator may require by test order that vehicles of a specified configuration be selected in a manner designated by him and submitted to him at such place as he may designate for the purpose of conducting emission tests. Such tests shall be conducted in accordance with § 86.608 of these regulations to determine whether vehicles manufactured by the manufacturer conform with the regulations with respect to which the certificate of conformity was issued.

(b)(1) Whenever the Administrator conducts a test on a test vehicle or the Administrator and manufacturer each conduct a test on the same test vehicle, the results of the Administrator's test shall comprise the official data for that vehicle.

(2) Whenever the manufacturer conducts all tests on a test vehicle, the manufacturer's test data will be accepted as the official data: *Provided*, That if the Administrator makes a determination based on testing under paragraph (a)

of this section that there is a substantial lack of agreement between the manufacturer's test results and the Administrator's test results, no manufacturer's test data from the manufacturer's test facility will be accepted for purposes of this subpart.

(c) In the event that testing conducted under paragraph (a) of this section demonstrates a lack of agreement under paragraph (b)(2), of this section, the Administrator will:

(1) Notify the manufacturer in writing of his determination that the test facility is inappropriate for conducting the tests required by this subpart and the reasons therefor, and

(2) Reinstate any manufacturer's data upon a showing by the maufacturer that the data acquired under paragraph (a) of this section was erroneous and the manufacturer's data was correct.

(d) The manufacturer may request in writing that the Administrator reconsider his determination in paragraph (b)(2) of this section based on data or information which indicates that changes have been made to the test facility and such changes have resolved the reasons for disqualification.

§ 86.605 Maintenance of records; submittal of information.

(a) The manufacturer of any new motor vehicle subject to any of the standards or procedures prescribed in this part shall establish, maintain and retain the following adequately organized and indexed records:

(1) *General records.* (i) (A) Identification and description of all vehicles tested pursuant to a test order issued under this part. (B) A description of all emission control systems which are installed on or incorporated in each test vehicle. (C) A description of all procedures used to test each of such vehicles. (ii) A properly filed application for certification, following the format prescribed by the EPA for the apropriate model year, fulfills each of the requirements of this paragraph (a)(1)(i) of this section.

(iii) Test equipment description, including:

(A) Dynamometer.

(*1*) Inertia loading.

(*2*) Road load power absorption at 50 m.p.h.

(*3*) Manufacturer, model and serial number.

(B) Constant Volume Sampler.

(*1*) Pressure of the mixture of exhaust and dilution air entering the positive displacement pump, pressure increase across the pump, and the temperature set point of the temperature control system.

(*2*) Number of revolutions of the positive displacement pump accumulated while test is in progress and exhaust samples are being collected.

(*3*) Humidity of dilution air.

(*4*) Manufacturer, model, type and serial number.

(C) Instrumentation.

(*1*) Manufacturer, model and serial number for each analyzer.

(*2*) Pertinent information such as tuning, gain, ranges and calibration data.

(*3*) Identification of zero, span, exhaust gas and dilution air sample traces.

(*4*) Temperature set point of heated sample line and heated hydrocarbon detector temperature control system (for diesel vehicles only).

(D) Test cell.

(*1*) Barometric pressure, ambient temperature and humidity.

(*2*) Date and time of day.

(iv) In lieu of recording test equipment information, reference to a vehicle test cell number may be used, with the advance approval of the Administrator: *Provided,* The test cell records show the pertinent information.

(2) *Individual records.* (i) A complete record of all emission tests performed pursuant to this subpart (except tests performed by EPA directly), including all individual worksheets and/or other documentation relating to each such test, or exact copies thereof; the date, time, purpose, and location of each test; the number of miles accumulated on the vehicle when the test began and ended; and the names of supervisory personnel responsible for the conduct of the test.

(ii) A record and description of any repairs performed prior to and/or subsequent to approval by the Administrator, giving the date and time of the repair, the reason for it, the person authorizing it, and the names of supervisory personnel responsible for the conduct of the repair.

(iii) The dates when the vehicle was shipped from the assembly plant or storage facility, and when it was received by the testing facility.

(iv) A brief description of any significant events, commencing with the batch sample selection process, but not described by an entry under one of the previous headings, including such extraordinary events as vehicle accident.

(v) The actual curb weight, inertia weight class, and drive wheel tire pressure for each test vehicle.

(b) All records required to be maintained under this subpart shall be retained by the manufacturer for a period of one (1) year after completion of all testing in response to a test order. Records may be retained as hard copy or reduced to microfilm, punch cards, etc., depending upon the record retention procedures of the manufacturer: *Provided,* That in every case all the information contained in the hard copy shall be retained.

(c) The manufacturer shall, pursuant to a request made by the Administrator, submit to the Administrator the following information with regard to vehicle production:

(1) Number of vehicles, by configuration and assembly plant, scheduled for production for the time period designated in the request.

(2) Number of vehicles, by configuration and assembly plant, produced during the time period designated in the request which are complete for introduction into commerce.

(d) Nothing in this section shall limit the Administrator's discretion to require the manufacturer to retain additional records or submit information not specifically required by this section.

(e) All reports, submissions, notifications and requests for approvals made under this subpart shall be addressed to:

Director, Mobile Source Enforcement Division (EN-340), U.S. Environmental Protection Agency, 401 M Street, SW, Washing, D.C. 20460.

§ 86.606 Entry and access.

(a) In order to allow the Administrator to determine whether a manufacturer is complying with the provisions of a test order and the provisions of this subpart, a manufacturer shall admit any EPA Enforcement Officer during operating hours upon demand and upon presentation of credentials to any of the following:

(1) Any facility where any vehicle to be introduced into commerce is manufactured, assembled, or stored;

(2) Any facility where any tests conducted pursuant to a test order or any procedures or activities connected with such tests are or were performed;

(3) Any facility where any vehicle which is being, was, or is to be tested is present; and

(4) Any facility where any record or other document relating to any of the above is located.

(b) Upon admission to any facility referred to in paragraph (a) of this section, any EPA Enforcement Officer shall be allowed:

(1) To inspect and monitor any part or aspect of such procedures, activities, manufacturing, assembly, storage and testing facilities, including, but not limited to, monitoring vehicle selection, preparation, preconditioning, mileage accumulation, emission tests, maintenance, and vehicle soak and storage procedures; and to verify calibration of test equipment;

(2) To inspect and monitor any aspects of vehicle manufacture, assembly or storage and other procedures;

(3) To inspect and make copies of any records or documents, related to the selection and testing of a vehicle in compliance with a test order;

(4) To inspect and photograph any part or aspect of any such vehicle and any component used in the assembly thereof that is reasonably related to the purpose of his entry.

(c) Any EPA Enforcement Officer shall be furnished by those in charge of a facility being inspected with such reasonable assistance as he may request to help him discharge any function listed in this subpart. A recipient of a test order is required to cause those in charge of a facility operated for his benefit to furnish such reasonable assistance without charge to EPA whether or not the recipient controls the facility.

(d) The duty to admit or cause to be admitted any EPA Enforcement Officer applies whether or not the recipient owns or controls the facility in question and applies both to domestic and to foreign manufacturers and facilities. EPA will not attempt to make any inspections which it has been informed that local foreign law forbids. However, if local for-

eign law makes it impossible to do what is necessary to ensure the accuracy of data generated at a facility, no informed judgment can be made that the new motor vehicles being manufactured by the manufacturer do, in fact, conform to the regulations with respect to which the certificate of conformity was issued. It is the responsibility of the manufacturer to locate its testing and manufacturing facilities in jurisdictions where this situation will not arise.

(e) For purposes of this section:

(1) "Presentation of Credentials" shall mean display of the document designating a person as an EPA Enforcement Officer.

(2) Where vehicle storage areas or facilities are concerned, "operating hours" shall mean all times during which personnel other than custodial personnel are at work in the vicinity of the area or facility and have access to it.

(3) Where facilities or areas other than those covered by paragraph (e)(2) of this section are concerned, "operating hours" shall mean all times during which an assembly line is in operation, or vehicle assembly is taking place, or all times during which testing, repair, mileage accumulation, production or compilation of records, or any other procedure or activity related to testing, or to vehicle manufacture or assembly is being carried out in a facility.

(4) "Reasonable assistance" includes, but is not limited to, clerical, copying, interpreting and translating services, and the making available on request of personnel of the facility being inspected during their working hours to inform the EPA Enforcement Officer of how the facility operates and to answer his questions. A manufacturer may be compelled to cause the personal appearance of any employee at such a facility before an EPA Enforcement Officer by written request for his appearance, signed by the Assistant Administrator for Enforceforcement, served on the manufacturer. Any such employee who has been instructed by the manufacturer to appear will be entitled to be accompanied, represented and advised by counsel.

(5) Any entry without 24 hours prior written or oral notification to the affected manufacturer shall be authorized in writing by the Assistant Administrator for Enforcement.

§ 86.607 Sample selection.

(a) Vehicles comprising a batch sample which are required to be tested, pursuant to a test order in accordance with this subpart, will be selected in the manner specified in the test order from a batch of vehicles of the configuration specified in the test order. The manufacturer will select test vehicles in the specified manner from the final vehicle inspection point or storage facility as specified in the test order. If the test order specifies that vehicles comprising the batch sample must be selected randomly, the random sampling will be obtained by consecutively numbering each of the vehicles in the batch at the final vehicle inspection point or at the storage facility and then using a table of random numbers to select the number of vehicles as specified in paragraph (c) of this section based on the batch size designated by the Administrator in the test order. An alternative random sampling plan may be employed: *Provided*, That the manufacturer requests approval of such a plan in advance of receipt of a test order and that the Administrator approves such a plan. If the test order does not specify that test vehicles must be randomly selected, the manufacturer shall select test vehicles consecutively. Any vehicles in the batch designated as special order may be exempted from the test vehicle selection in a manner prescribed in the test order.

(b) For 1976 and later model years the designated Acceptable Quality Level is 40 percent. The appropriate sampling plans associated with the designated AQL are contained in Appendix VIII, Tables II and III.

(c) The appropriate batch sample size will be determined by reference to Appendix VIII, Tables I and II. A code letter is obtained from Table I based on the batch size designated by the Administrator in the test order. The batch sample size will be equal to the maximum cumulative test sample size for the appropriate code letter obtained from Table I plus an additional 10 percent rounded off to the next highest number.

(d) If the test order specifies that vehicles comprising the batch sample must be selected randomly, individual vehicles comprising the test sample will be randomly selected from the batch sample using the same random selection plan as in paragraph (a) of this section. Test sample size will be determined by entering Table II in Appendix VIII at the code letter obtained from Table I.

(e) The test vehicles of the configuration selected for testing shall have been assembled by the manufacturer for distribution in commerce using his normal mass production processes.

(f) No quality control, testing, assembly or selection procedures shall be used on the completed vehicle or any portion thereof, including parts and subassemblies, that will not be used during the production and assembly of all other vehicles of that configuration which will be distributed in commerce.

(g) Unless otherwise indicated in the test order, the manufacturer shall begin selection of test vehicles from the production batch of the configuration specified in the test order next scheduled after receipt of the test order.

(h) The test order may specify that EPA Enforcement Officers, rather than the manufacturer, will select the test vehicles according to the method described in paragraph (a) of this section.

(i) The manufacturer shall keep on hand all vehicles in the batch sample until such time as the batch is accepted or rejected in accordance with § 86.610.

§ 86.608 Test procedures.

(a) The prescribed test procedure is contained in Appendix IX.

(b) The manufacturer shall not adjust, repair, prepare or modify the vehicles selected for testing and shall not perform any emission tests on vehicles selected for testing pursuant to the test order unless such adjustment, repair, preparation, modification and/or tests are part of the manufacturer's prescribed end-of-line inspection procedures and are documented in the manufacturer's vehicle assembly and inspection procedures or unless such adjustments and/or tests are required or permitted under this subpart or are approved in advance by the Administrator. The manufacturer may perform adjustment, repair, preparation, modification and/or tests normally performed by his dealer or predelivery center to prepare the vehicle for delivery to a customer or the adjustment, repair, preparation, modification and/or tests normally performed at the port-of-entry by the manufacturer to prepare the vehicle for delivery to a dealer or customer: *Provided*, That such adjustment, repair, preparation, modification and/or tests are documented in written instructions or are approved by the Administrator in advance of their performance.

(c) The manufacturer may accumulate up to 4,000 miles on each selected vehicle prior to performing exhaust emission testing.

(1) Mileage accumulation may be performed in any manner the manufacturer desires. The same amount of mileage within ±10 miles shall be accumulated on all test vehicles.

(2) The manufacturer shall accumulate mileage at a minimum rate of 300 miles during each 24 hour period, unless otherwise provided by the Administrator.

(3) Mileage accumulation shall be performed on a sufficient number of test vehicles during each 24 hour period to assure that the number of vehicles tested per day fulfills the requirements of paragraph (e) of this section.

(d) No maintenance will be performed on test vehicles after a batch sample is selected for testing nor will any test vehicle substitution or replacement be allowed, unless requested of the Administrator by the manufacturer and approved by the Administrator in advance of the performance of any maintenance or vehicle substitution.

(e) The manufacturer will be allowed 24 hours to ship test vehicles from the assembly plant or storage facility to the test facility if the test facility is not located at the plant or storage facility or in close proximity to the plant or storage facility: Except, That the Administrator may approve more time based upon a request by the manufacturer accompanied by a satisfactory justification.

(f) In the event a vehicle is incapable of completing the mileage accumulation or completing the emission tests because of vehicle malfunction, the manufacturer may request that the Administrator authorize him to repair or replace the vehicle. Any replacement vehicles will be elected from the batch sample in a manner prescribed in the test order.

(g) The manufacturer shall notify the Administrator, within one working day of receipt of the test order, which test facility will be used to comply with the test order and the number of available cells at that facility. If no test cells are available at the desired facility, the manufacturer must provide alternate testing capability satisfactory to the Administrator. The manufacturer shall complete emission testing on a minimum of four vehicles per 24 hour period including voided tests for each available test cell at his testing facility: Except, That the Administrator may approve a longer period based upon a request by the manufacturer accompanied by satisfactory justification.

(h) The manufacturer shall perform test vehicle selection, preparation, mileage accumulation, shipping, and testing in such a manner as to assure that the audit is performed in an expeditious manner.

(i) The manufacturer will be permitted to retest any test vehicle: *Provided,* That all vehicles selected for testing are tested the same number of times and that not more than three tests per vehicle are performed. The manufacturer may accumulate additional mileage before conducting a retest: *Provided,* That the same additional mileage is accumulated on all test vehicles to be retested within a range of ±10 miles.

§ 86.609 Calculation and reporting of test results and low-mileage emissions targets.

(a) Initial test results shall be calculated following the method prescribed in Appendix IX of this part.

(b) Final test results for each test vehicle shall be calculated by summing the individual test results for each test vehicle and dividing by the number of tests conducted on the vehicle. Before any final test result is compared to the applicable low-mileage emissions target as calculated in paragraph (c) of this section, it shall be rounded, in accordance with ASTM E 29–67, to two significant figures.

(c) The low-mileage emissions target for each pollutant shall be computed by dividing the appropriate emission standard by the deterioration factor for the engine family to which the selected configuration belongs derived from the certification process for the current model year. The result shall be rounded, in accordance with ASTM E 29–67, to two significant figures.

(d) Within five working days after completion of testing of all vehicles in a batch sequence, the manufacturer shall submit to the Administrator a report which shall include the following:

(1) The location and description of the manufacturer's exhaust emission test facilities which meet the specifications of Subpart A, B, C, or D of Part 85 for 1976 model year vehicles and Subpart B of this Part 86 for 1977 and later model years as applicable, and were utilized to conduct testing reported pursuant to this section.

(2) A description of the vehicle selection method used, referencing any tables of random numbers that were used if the vehicles were randomly selected, and the name of the person in charge of the random number selection.

(3) Deterioration factors and low-mileage emission targets for the selected configuration.

(4) For each test conducted,

(i) Test vehicle description including:

(A) Configuration and engine family identification.

(B) Year, make, build date, and model of vehicle.

(C) Vehicle Identification Number.

(D) Miles accumulated on vehicle.

(ii) Location where mileage accumulation was conducted and description of accumulation schedule.

(iii) Test number and measured emissions, for all exhaust emission tests for each valid test and for each invalid test, and the reason for invalidation and the date of each test.

(iv) A complete description of any modification, repair, preparation, maintenance and/or testing which was performed on the test vehicle and (A) has not been reported pursuant to any other paragraph of this subpart and (B) will not be performed on all other production vehicles.

(v) Where a replacement vehicle was authorized by the Administrator, the reason for the replacement and, if any, the final test results for the replaced vehicle.

(vi) Any other information the Administrator may request relevant to the determination as to whether the new motor vehicles being manufactured by the manufacturer do in fact conform with the regulations with respect to which the certificate of conformity was issued.

(5) The following statement and endorsement:

This report is submitted pursuant to section 206 and section 208 of the Clean Air Act. All testing for which data is reported herein was conducted in strict conformance with applicable regulations under 40 CFR Part 86 et seq. All the data reported herein is a true and accurate representation of such testing. All other information reported herein is, to the best of

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(Company name)

knowledge, true and accurate. I am aware of the penalties associated with violations of the Clean Air Act and the regulations thereunder.

(Authorized Company Representative)

§ 86.610 Acceptance and rejection of batches.

(a) A failed vehicle is one whose final test results, for one or more of the three exhaust pollutants, when compared to the applicable low-mileage emissions target for that pollutant, exceeds that target.

(b) The batch from which a batch sample is selected will be accepted or rejected for each pollutant based upon the number of test vehicles in the batch sample with measured emissions exceeding the applicable low-mileage emissions target as calculated in § 86.609. A sufficient number of test samples of size determined by entering Appendix VIII, Table II at the appropriate code letter will be drawn from the batch sample and the test vehicles tested until the cumulative number of vehicles exceeding the low-mileage emissions target for each pollutant is less than or equal to the acceptance number or greater than or equal to the rejection number appropriate for the cumulative number of vehicles tested. The acceptance and rejection numbers at the appropriate code letter in Appendix VIII, Table II will be used in determining whether the acceptance or rejection of a batch has occurred. Once a batch is accepted or rejected for a particular pollutant, the number of vehicles exceeding the low-mileage emissions target for that pollutant shall not be considered any further for the purposes of the audit of that batch.

(c) Test samples from the batch sample shall continue to be drawn until a decision of acceptance or rejection can be made with regard to each pollutant.

(d) Acceptance or rejection of a batch takes place when testing is completed on the last vehicle required to make a decision under paragraph (b) of this section.

§ 86.611 Acceptance and rejection of batch sequence.

(a) The manufacturer shall continue to inspect consecutive batches until the batch sequence is accepted for all pollutants or rejected for any one pollutant. A sufficient number of consecutive batches will be inspected until the cumulative number of rejected batches for each pollutant is less than or equal to the sequence acceptance number or the cumulative number of rejected batches for any one pollutant is greater than or equal to the sequence rejection number appropriate for the cumulative number of batches inspected. The number of batches required to be inspected and the batch sequence acceptance and rejection numbers shall be determined by entering Appendix VIII, Table III at the appropriate code letter.

(b) Acceptance or rejection of a batch sequence takes place when the decision is made on the last vehicle required to make a decision under paragraph (a) of this section.

(c) If the batch sequence is accepted for all three pollutants, the manufacturer will not be required to perform any additional testing of vehicles from subsequent batches pursuant to the initiating test order.

(d) The Administrator may terminate testing earlier than required in paragraph (a) of this section.

§ 86.612 Suspension and revocation of certificates of conformity.

(a) The certificate of conformity is suspended with respect to any vehicles failing pursuant to § 86.610(a), effective from the time the testing is completed.

(b) If the batch sequence is not accepted in accordance with § 86.611, batch sample selection and testing will no

longer be required and the Administrator may suspend the certificate of conformity with respect to that vehicle configuration for those vehicles produced at that plant. Such suspension shall not occur before ten days after failure to accept the batch sequence.

(c) If the results of vehicle testing pursuant to these regulations indicate the vehicles of a particular configuration produced at more than one plant do not conform to the regulations with respect to which the certificate of conformity was issued, the Administrator may suspend the certificate of conformity with respect to that configuration for vehicles manufactured by the manufacturer in other plants of the manufacturer.

(d) The Administrator will notify the manufacturer in writing of any suspension or revocation of a certificate of conformity in whole or in part: Except, That the certificate of conformity is immediately suspended with respect to any vehicle failing pursuant to § 86.610(a) and as provided for in paragraph (a) of this section.

(e) The Administrator may revoke a certificate of conformity when the certificate has been suspended pursuant to paragraph (b) or (c) of this section if the proposed remedy for the nonconformity is one requiring a design change or changes to the engine and/or emission control system as described in the Application for Certification of the affected configuration.

(f) Once a certificate has been suspended for a failed vehicle as provided for in paragraph (a) of this section, the manufacturer must take the following actions:

(1) Before the certificate is reinstated for that failed vehicle,

(i) Remedy the nonconformity, and

(ii) Demonstrate that the vehicle conforms to the applicable low-mileage emissions target by retesting the vehicle in accordance with these regulations.

(2) Submit a written report to the Administrator which contains a description of the remedy and test results for each vehicle in addition to other information that may be required by this regulation.

(g) Once a certificate has been suspended pursuant to paragraph (b) or (c) of this section, the manufacturer must take the following actions before the Administrator will consider reinstating such certificate:

(1) Submit a written report to the Administrator which identifies the reason for the noncompliance of the vehicles, describes the proposed remedy, including a description of any proposed quality control and/or quality assurance measures to be taken by the manufacturer to prevent the future occurrence of the problem, and states the date on which the remedies will be implemented, and

(2) Demonstrate that the vehicle configuration for which the certificate of conformity has been suspended does in fact comply with these regulations by testing vehicles from consecutively produced batches of that vehicle configuration at the plant or plants specified by the Administrator in accordance with §§ 86.610 and 86.611 and the conditions specified in the initial test order: Except, That if the manufacturer elects to continue testing individual vehicles after suspension of a certificate, the certificate is reinstated for any vehicle actually determined to be in conformance with the applicable low-mileage emissions targets through testing in accordance with the applicable test procedures: *Provided*, That the Administrator has not revoked the certificate pursuant to paragraph (e) of this section.

(h) Once a certificate has been revoked for a configuration and the manufacturer desires to continue introduction into commerce of such configuration, the following action will be taken before the Administrator will consider reissuing such certificate:

(1) If the Administrator determines that the proposed change or changes in vehicle design may have an effect on emission performance deterioration, he will so notify the manufacturer within five working days after receipt of the report in paragraph (g) of this section whether subsequent testing under this subpart will be sufficient to evaluate the proposed change or whether additional testing will be required.

(2) After implementing the change or changes intended to remedy the nonconformity, demonstrate that the vehicle configuration for which the certificate of conformity was revoked does in fact comply with these regulations by testing vehicles from consecutively produced batches of that vehicle configuration in accordance with §§ 86.610 and 86.611 and the conditions specified in the initial test order. This testing will be considered by the Administrator to satisfy the testing requirements of § 86.077–32 or § 86.077–33 if the Administrator has so notified the manufacturer. If the subsequent audit results in acceptance of the batch sequence, the Administrator will reissue the certificate or amend the certificate to include that configuration as the case may be: *Provided*, That the manufacturer has satisfied any of the testing requirements pursuant to paragraph (h) (1) of this section. If the subsequent audit results in rejection of the batch sequence, the revocation shall remain in effect. Any design change approvals under this subpart shall be limited to the configuration affected by the test order.

(i) A manufacturer may at any time subsequent to an initial suspension of a certificate of conformity with respect to a test vehicle pursuant to paragraph (a) of this section, but not later than fifteen (15) days or such other period as may be allowed by the Administrator after notification of the Administrator's decision to suspend or revoke a certificate of conformity in whole or in part pursuant to paragraphs (b), (c) or (e) of this section, request that the Administrator grant such manufacturer a hearing as to whether the tests have been properly conducted or any sampling methods have been properly applied.

(j) If, after the Administrator suspends or revokes a certificate of conformity pursuant to this section or notifies a manufacturer of his intent to do so under § 86.077–30(d), and prior to the commencement of a hearing under § 86.613, the manufacturer demonstrates to the Administrator's satisfaction that the decision to suspend or revoke the certificate was based on erroneous information, the Administrator will reinstate such certificate.

(1) To permit a manufacturer to avoid storing non-test vehicles when conducting an audit of a configuration subsequent to suspension or revocation of the certificate of conformity for that configuration resulting from failure of the initial audit of that configuration, he may request that the Administrator conditionally reinstate the certificate for that configuration. The Administrator may reinstate the certificate subject to the condition that the manufacturer consents to recall all vehicles of that configuration produced from the time the certificate is reinstated if the configuration fails the subsequent audit and to remedy any nonconformity at no expense to the owner.

§ 86.613 Hearings on suspension and revocations of certificates of conformity.

(a) *Applicability.* The procedures prescribed by this section shall apply whenever a manufacturer requests a hearing pursuant to §§ 86.077–30(d) (6) (i), 86.612 (i).

(b) *Definitions.* The following definitions shall be applicable to this section:

(1) "Hearing Clerk" shall mean the Hearing Clerk of the Environmental Protection Agency.

(2) "Manufacturer" refers to a manufacturer contesting a suspension or revocation order directed at the manufacturer.

(3) "Party" shall include the Agency, the manufacturer, and other interested parties, if any.

(4) "Presiding Officer" shall mean an Administrative Law Judge appointed pursuant to 5 U.S.C. 3105 (see also 5 CFR Part 930 as amended).

(5) "Judicial Officer" shall mean an officer or employee of the Agency appointed as a Judicial Officer by the Administrator pursuant to this section who shall meet the qualifications and perform functions as follows:

(i) Officer—there may be designated for the purposes of this section one or more Judicial Officers. As work requires, there may be a Judicial Officer designated to act for the purposes of a particular case.

(ii) Qualifications—A Judicial Officer may be a permanent or temporary employee of the Agency who performs other duties for the Agency. Such Judicial Officer shall not be employed by the Office of Enforcement or have any connection with the preparation or presentation of evidence for a hearing held pursuant to this subpart.

(iii) Functions—the Administrator may consult with a Judicial Officer or delegate all or part of his authority to act in a given case under this section to a Judicial Officer: *Provided*, That this

delegation shall not preclude the Judicial Officer from referring any motion or case to the Administrator when the Judicial Officer determines such referral to be appropriate.

(c) *Request for public hearing.* (1) If the manufacturer disagrees with the Administrator's decision to suspend or revoke a certificate or disputes the basis for an automatic suspension pursuant to § 86.612(a), he may request a public hearing as described in this section. Requests for such a hearing shall be filed with the Administrator not later than 15 days after the Administrator's notification of his decision to suspend or revoke unless otherwise specified by the Administrator. Two copies of such request shall simultaneously be served upon the Director of the Mobile Source Enforcement Division and two copies filed with the Hearing Clerk. Failure of the manufacturer to request a hearing within the time provided shall constitute a waiver of his right to such a hearing. Subsequent to the expiration of the period for requesting a hearing as of right, the Administrator may, in his discretion and for good cause shown, grant the manufacturer a hearing to contest the suspension or revocation.

(2) The request for a public hearing shall contain:

(i) A statement as to which vehicle configurations or engine families are to be the subject of the hearing;

(ii) A concise statement of the issues to be raised by the manufacturer at the hearing for each vehicle configuration or engine family or vehicle for which the manufacturer has requested the hearing. *Provided, however,* That in the case of the hearing requested under § 86.612(i), the hearing shall be restricted to the following issues:

(A) Whether tests were conducted in accordance with applicable regulations under this part;

(B) Whether test equipment was properly calibrated and functioning;

(C) Whether sampling procedures specified in Appendix VIII of this part were followed; and

(D) Whether there exists a basis for distinguishing vehicles produced at plants other than the one from which vehicles were tested which would invalidate the Administrator's decision under § 86.612(c);

(iii) A statement specifying reasons the manufacturer believes he will prevail on the merits on each of the issues so raised; and

(iv) A summary of the evidence which supports the manufacturer's position on each of the issues so raised.

(3) A copy of all requests for public hearings shall be kept on file in the Office of the Hearing Clerk and shall be made available to the public during Agency business hours.

(d) *Summary decision.* (1) In the case of a hearing requested under § 86.612(i), when it clearly appears from the data and other information contained in the request for a hearing that there is no genuine and substantial question of fact with respect to the issues specified in § 86.613(c)(2)(ii), the Administrator will enter an order denying the request for a hearing, and reaffirming the original decision to suspend or revoke a certificate of conformity, if such decision has been made pursuant to § 86.612(d) at any time prior to the decision to deny the request for a hearing.

(2) In the case of a hearing requested under § 86.077–30(d)(6)(i), to challenge a proposed suspension of a certificate of conformity for the reasons specified in § 86.077–30(d)(1)(i) or (d)(1)(ii) when it clearly appears from the data and other information contained in the request for a hearing that there is no genuine and substantial question of fact with respect to the issue of whether the refusal to comply with the provisions of a test order or any other requirement of § 86.603 was caused by conditions and circumstances outside the control of the manufacturer, the Administrator will enter an order denying the request for a hearing, and suspending the certificate of conformity.

(3) Any order issued under paragraphs (d)(1) or (2) of this section shall have the force and effect of a final decision of the Administrator, as issued pursuant to paragraph (w)(4) of this section.

(4) If the Administrator determines that a genuine and substantial question of fact does exist with respect to any of the issues referred to in paragraphs (d)(1) and (2) of this section, he shall grant the request for a hearing and publish a notice of public hearing in accordance with paragraph (h) of this section.

(e) *Filing and service.* (1) An original and two copies of all documents or papers required or permitted to be filed pursuant to this section shall be filed with the Hearing Clerk. Filing shall be deemed timely if mailed, as determined by the postmark, to the Hearing Clerk within the time allowed by this section. If filing is to be accomplished by mailing, the documents shall be sent to the address set forth in the notice of public hearing as described in paragraph (h) of this section.

(2) To the maximum extent possible, testimony shall be presented in written form. Copies of written testimony shall be served upon all parties as soon as practicable prior to the start of the hearing. A certificate of service shall be provided on or accompany each document or paper filed with the Hearing Clerk. Documents to be served upon the Director of the Mobile Source Enforcement Division shall be sent by registered mail to: Director, Mobile Source Enforcement Division, U.S. Environmental Protection Agency (EN–340), 401 M Street, SW., WSM, Washington, D.C. 20460. Service by registered mail is complete upon mailing.

(f) *Time.* (1) In computing any period of time prescribed or allowed by this section, except as otherwise provided, the day of the act or event from which the designated period of time begins to run shall not be included. Saturdays, Sundays, and Federal legal holidays shall be included in computing any such period allowed for the filing of any document or paper, except that when such period expires on a Saturday, Sunday, or Federal legal holiday, such period shall be extended to include the next following business day.

(2) A prescribed period of time within which a party is required or permitted to do an act shall be computed from the time of service, except that when service is accomplished by mail, three days shall be added to the prescribed period.

(g) *Consolidation.* The Administrator or the Presiding Officer in his discretion may consolidate two or more proceedings to be held under this section for the purpose of resolving one or more issues whenever it appears that such consolidation will expedite or simplify consideration of such issues. Consolidation shall not affect the right of any party to raise issues that could have such consolidation will expedite or simoccurred.

(h) *Notice of public hearings.* (1) Notice of a public hearing under this section shall be given by publication in the FEDERAL REGISTER and by such other means as the Administrator finds appropriate to provide notice to the public. To the extent possible hearings under this section shall be scheduled to commence within 14 days of receipt of the application in paragraph (c).

(i) *Amicus curiae.* Persons not parties to the proceeding wishing to file briefs may do so by leave of the Presiding Officer granted on motion. A motion for leave shall identify the interest of the applicant and shall state the reasons why the proposed amicus brief is desirable.

(j) *Presiding Officer.* The Presiding officer shall have the duty to conduct a fair and impartial hearing in accordance with 5 U.S.C. sections 554, 556 and 557 and to take all necessary action to avoid delay in the disposition of the proceedings and to maintain order. He shall have all power consistent with Agency rule and with the Administrative Procedure Act necessary to this end, including the following:

(1) To administer oaths and affirmations;

(2) To rule upon offers of proof and exclude irrelevant or repetitious material;

(3) To regulate the course of the hearings and the conduct of the parties and their counsel therein;

(4) To hold conferences for simplification of the issues or any other proper purpose;

(5) To consider and rule upon all procedural and other motions appropriate in such proceedings;

(6) To require the submission of direct testimony in written form with or without affidavit whenever, in the opinion of the Presiding Officer, oral testimony is not necessary for full and true disclosure of the facts;

(7) To enforce agreements and orders requiring access as authorized by law;

(8) To require the filing of briefs on any matter on which he is required to rule;

(9) To require any party or any witness, during the course of the hearing, to state his position on any issue;

(10) To take or cause depositions to be taken whenever the ends of justice would be served thereby;

(11) To make decisions or recommend decisions to resolve the disputed issues on the record of the hearing;

(12) To issue, upon good cause shown, protective orders as described in paragraph (n) of this section.

(k) *Conferences.* (1) At the discretion of the Presiding Officer, conferences may be held prior to or during any hearing. The Presiding Officer shall direct the Hearing Clerk to notify all parties of the time and location of any such conference. At the discretion of the Presiding Officer, persons other than parties may attend. At a conference the Presiding Officer may:

(i) Obtain stipulations and admissions, receive requests and order depositions to be taken, identify disputed issues of fact and law, and require or allow the submission of written testimony from any witness or party;

(ii) Set a hearing schedule for as many of the following as are deemed necessary by the Presiding Officer:

(A) Oral and written statements;

(B) Submission of written direct testimony as required or authorized by the Presiding Officer;

(C) Oral direct and cross-examination of a witness where necessary as prescribed in paragraph (p) of this section; and

(D) Oral argument, if appropriate.

(iii) Identify matters of which official notice may be taken;

(iv) Consider limitation of the number of expert and other witnesses;

(v) Consider the procedure to be followed at the hearing; and

(vi) Consider any other matter that may expedite the hearing or aid in the disposition of the issue.

(2) The results of any conference including all stipulations shall, if not transcribed, be summarized in writing by the Presiding Officer and made part of the record.

(l) *Primary discovery* (exchange of witness lists and documents). (1) At a prehearing conference or within some reasonable time set by the Presiding Officer prior to the hearing, each party shall make available to the other parties the names of the expert and other witnesses the party expects to call, together with a brief summary of their expected testimony and a list of all documents and exhibits which the party expects to introduce into evidence. Thereafter, witnesses, documents, or exhibits may be added and summaries of expected testimony amended upon motion by a party.

(2) The Presiding Officer, may, upon motion by a party or other person, and for good cause shown, by order (i) restrict or defer disclosure by a party of the name of a witness or a narrative summary of the expected testimony of a witness, and (ii) prescribe other appropriate measures to protect a witness. Any party affected by any such action shall have an adequate opportunity, once he learns the name of a witness and obtains the narrative summary of his expected testimony, to prepare for the presentation of his case.

(m) *Other discovery.* (1) Except as so provided by paragraph (1) of this section, further discovery, under this paragraph, shall be permitted only upon determination by the Presiding Officer:

(i) That such discovery will not in any way unreasonably delay the proceeding;

(ii) That the information to be obtained is not obtainable voluntarily; and

(iii) That such information has significant probative value. The Presiding Officer shall be guided by the procedures set forth in the Federal Rules of Civil Procedure, where practicable, and the precedents thereunder, except that no discovery shall be undertaken except upon order of the Presiding Officer or upon agreement of the parties.

(2) The Presiding Officer shall order depositions upon oral questions only upon a showing of good cause and upon a finding that:

(i) The information sought cannot be obtained by alternative methods; or

(ii) There is a substantial reason to believe that relevant and probative evidence may otherwise not be preserved for presentation by a witness at the hearing.

(3) Any party to the proceeding desiring an order of discovery shall make a motion or motions therefor. Such a motion shall set forth:

(i) The circumstances warranting the taking of the discovery;

(ii) The nature of the information expected to be discovered; and

(iii) The proposed time and place where it will be taken.

If the Presiding Officer determines the motion should be granted, he shall issue an order for the taking of such discovery together with the conditions and terms thereof.

(4) Failure to comply with an order issued pursuant to this paragraph may lead to the inference that the information to be discovered would be adverse to the person or party from whom the information was sought.

(n) *Protective orders, in camera proceedings.* (1) Upon motion by a party or by the person from whom discovery is sought, and upon a showing by the movant that the disclosure of the information to be discovered, or a particular part thereof, (other than emission data) would result in methods or processes entitled to protection as trade secrets of such person being divulged, the Presiding Officer may enter a protective order with respect to such material. Any protective order shall contain such terms governing the treatment of the information as may be appropriate under the circumstances to prevent disclosure outside the hearing: *Provided,* That the order shall state that the material shall be filed separately from other evidence and exhibits in the hearing. Disclosure shall be limited to parties to the hearing, their counsel and relevant technical consultants, and authorized representatives of the United States concerned with carrying out the Act. Except in the case of the government, disclosure may be limited to counsel for parties who shall not disclose such information to the parties themselves. Except in the case of the government, disclosure to a party or his counsel shall be conditioned on execution of a sworn statement that no disclosure of the information will be made to persons not entitled to receive it under the terms of the protective order. (No such provision is necessary where government employees are concerned because disclosure by them is subject to the terms of 18 U.S.C. 1905.)

(2) (i) A party or person seeking a protective order may be permitted to make all or part of the required showing in camera. A record shall be made of such in camera proceedings. If the Presiding Officer enters a protective order following a showing in camera, the record of such showing shall be sealed and preserved and made available to the agency or court in the event of appeal. (ii) Attendance at any in camera proceeding may be limited to the Presiding Officer, the agency, and the person or party seeking the protective order.

(3) Any party, subject to the terms and conditions of any protective order issued pursuant to paragraph (n)(1) of this section, desiring for the presentation of his case to make use of any in camera documents or testimony shall make application to the Presiding Officer by motion setting forth the justification therefor. The Presiding Officer, in granting any such motion, shall enter an order protecting the rights of the affected persons and parties and preventing unnecessary disclosure of such information, including the presentation of such information and oral testimony and cross-examination concerning it in executive session, as in his discretion is necessary and practicable.

(4) In the submittal of proposed findings, briefs, or other papers, counsel for all parties shall make a good faith attempt to refrain from disclosing the specific details of in camera documents and testimony. This shall not preclude references in such proposed findings, briefs, or other papers to such documents or testimony including generalized statements based on their contents. To the extent that counsel considers it necessary to include specific details in their the hearing, shall be in writing and shall presentations, such data shall be incorporated in separate proposed findings, briefs, or other papers marked "confidential," which shall become part of the in camera record.

(o) *Motions.* (1) All motions, except those made orally during the course of the hearing, shall be writing and shall state with particularity the grounds therefore, shall set forth the relief or order sought, and shall be filed with the Hearing Clerk and served upon all parties.

(2) Within such time as may be fixed by the Administrator, the judicial officer,

or the Presiding Officer, as appropriate, any party may serve and file an answer to the motion. The movant shall, if requested by the Administrator, the judicial officer, or the Presiding Officer, as appropriate, serve and file reply papers, within the time set by the request.

(3) The Presiding Officer shall rule upon all motions filed or made prior to the filing of his decision or accelerated decision, as appropriate. The Administrator or the judicial officer, as appropriate, shall rule upon all motions filed prior to the appointment of a Presiding Officer and all motions filed after the filing of the decision of the Presiding Officer or accelerated decision. Oral argument of motions will be permitted only if the Presiding Officer, the Administrator or the judicial officer, as appropriate, deems it necessary.

(p) *Evidence.* (1) The official transcripts and exhibits, together with all papers and requests filed in the proceeding, shall constitute the record. Immaterial or irrelevant parts of an admissible document shall be segregated and excluded so far as practicable. Documents or parts thereof subject to a protective order under paragraph (n) of this section shall be segregated. Evidence may be received at the hearing even though inadmissible under the rules of evidence applicable to judicial proceedings. The weight to be given evidence shall be determined by its reliability and probative value.

(2) The Presiding Officer shall allow the parties to examine and cross-examine a witness to the extent that such examination and cross-examination is necessary for a full and true disclosure of the facts.

(3) Rulings of the Presiding Officer on the admissibility of evidence, the propriety of examination and cross-examination and other procedural matters shall appear in the record.

(4) Parties shall automatically be presumed to have taken exception to an adverse ruling.

(q) *Record.* (1) Hearings shall be stenographically reported and transcribed and the original transcripts shall be part of the record and the sole official transcript. Copies of the record shall be filed with the Hearing Clerk and made available during Agency business hours for public inspection. Any person desiring a copy of the record of the hearing or any part thereof, except as provided in paragraph (n) of this section, shall be entitled to the same upon payment of the cost thereof.

(2) The official transcripts and exhibits, together with all papers and requests filed in the proceeding, shall constitute the record.

(r) *Proposed findings, conclusions.* (1) Within 4 days of the close of the reception of evidence, or within such longer time as may be fixed by the Presiding Officer, any party may submit for the consideration of the Presiding Officer proposed findings of fact, conclusions of law, and a proposed order, together with reasons therefor and briefs in support thereof. Such proposals shall be in writing, shall be served upon all parties, and shall contain adequate references to the record and authorities relied upon.

(2) The record shall show the Presiding Officer's ruling on the proposed findings and conclusions except when his order disposing of the proceeding otherwise informs the parties of the action taken by him thereon.

(s) *Decision of the Presiding Officer.* (1) Unless extended by the Administrator, the Presiding Officer shall issue and file with the Hearing Clerk his decision within 14 days (or within 7 days in the case of a hearing requested under § 86.612(i)) after the period for filing proposed findings as provided for in paragraph (r) of this section has expired.

(2) The Presiding Officer's decision shall become the decision of the Administrator (i) when no notice of intention to appeal as described in paragraphs (t) and (u) of this section is filed, 10 days after issuance thereof, unless in the interim the Administrator shall have taken action to review or stay the effective date of the decision; or (ii) when a notice of intention to appeal is filed but the appeal is not perfected as required by paragraph (t) or (u) of this section, 5 days after the period allowed for perfection of an appeal has expired unless within that 5 day period, the Administrator shall have taken action to review or stay the effective date of the decision;

(3) The Presiding Officer's decision shall include a statement of findings and conclusions, as well as the reasons or basis therefore, upon all the material issues of fact or law presented on the record and an appropriate rule or order. Such decision shall be supported by substantial evidence and based upon a consideration of the whole record.

(4) At any time prior to the issuance of his decision, the Presiding Officer may reopen the proceeding for the reception of further evidence. Except for the correction of clerical errors, the jurisdication of the Presiding Officer is terminated upon the issuance of his decision.

(t) *Appeal from the decision of the Presiding Officer.* (1) Any party to a proceeding may appeal the Presiding Officer's decision to the Administrator: *Provided,* That within 10 days after issuance of the Presiding Officer's decision such party files a notice of intention to appeal and an appeal brief within 20 days of such decision.

(2) When an appeal is taken from the decision of the Presiding Officer, any party may file a brief with respect to such appeal. The brief shall be filed within 15 days of the date of the filing of the appellant's brief.

(3) Any brief filed pursuant to this paragraph shall contain in the order indicated, the following:

(i) A subject index of the matter in the brief, with page references, and a table of cases (alphabetically arranged) textbooks, statutes, and other material cited, with page references thereto;

(ii) A specification of the issues intended to be urged: *Provided, however,* That in the case of a hearing requested under § 85.612(i), the brief shall be restricted to the issues specified in paragraph (c)(2)(ii) of this section;

(iii) The argument presenting clearly the points of fact and law relied upon in support of the position taken on each issue, with specific page references to the record and the legal or other material relied upon; and

(iv) A proposed order for the Administrator's consideration if different from the order contained in the Presiding Officer's decision.

(4) No brief in excess of 40 pages shall be filed without leave of the Administrator.

(5) Oral argument will be allowed only in the discretion of the Administrator.

(u) *Summary appeal.* (1) In the case of a hearing requested under § 86.612(i), any appeal taken from the decision of the Presiding Officer shall be conducted under this paragraph.

(2) Any party to the proceeding may appeal the Presiding Officer's decision to the Administrator by filing a notice of appeal within 10 days.

(3) The notice appeal shall be in the form of a brief, and shall conform to the requirements of paragraph (t)(3) of this section.

(4) Within 10 days after a notice of appeal from the decision of the Presiding Officer is filed under this paragraph, any party may file a brief with respect to such appeal.

(5) No brief in excess of 15 pages shall be filed without leave of the Administrator.

(v) *Review of the Presiding Officer's decision in absence of appeal.* (1) If, after the expiration of the period for taking an appeal as provided for by paragraphs (t) or (u) of this section, no notice of intention to appeal the decision of the Presiding Officer has been filed, or if filed, not perfected, the Hearing Clerk shall so notify the Administrator.

(2) The Administrator, upon receipt of notice from the Hearing Clerk that no notice of intention to appeal has been filed, or if filed, not perfected pursuant to paragraphs (t) or (u) of this section, may, on his own motion, within the time limits specified in paragraph (s)(2) of this section, review the decision of the Presiding Officer. Notice of the intention of the Administrator to review the decision of the Presiding Officer shall be given to all parties and shall set forth the scope of such review and the issues which shall be considered and shall make provision for filing of briefs.

(w) *Decision of appeal or review.* (1) Upon appeal from or review of the Presiding Officer's decision, the Administrator shall consider such parts of the record as are cited or as may be necessary to resolve the issues presented and in addition shall, to the extent necessary or desirable, exercise all the powers which he could have exercised if he had presided at the hearing.

(2) In rendering his decision, the Administrator shall adopt, modify or set aside the findings, conclusions, and order contained in the decision of the Presiding Officer and shall set forth in his decision a statement of the reasons or bases for his action.

(3) In those cases where the Administrator believes that he should have further information or additional views of the parties as to the form and content of the rule or order to be issued, the Administrator, in his discretion, may withhold final action pending the receipt of such additional information or views, or may remand the case to the Presiding Officer.

(4) Any decision rendered under this paragraph which completes disposition of a case shall be a final decision of the Administrator.

(x) *Reconsideration.* Within twenty (20) days after issuance of the Administrator's decision, any party may file with the Administrator a petition for reconsideration of such decision, setting forth the relief desired and the grounds in support thereof. Any petition filed under this subsection must be confined to new questions raised by the decision or final order and upon which the petitioner had no opportunity to argue before the Presiding Officer or the Administrator: *Provided, however,* That in the case of a hearing requested under § 86.612(i) such new questions shall be limited to the issues specified in paragraph (c)(2)(ii) of this section. Any party desiring to oppose such a petition shall file an answer thereto within ten (10) days after the filing of the petition. The filing of a petition for reconsideration shall not operate to stay the effective date of the decision or order or to toll the running of any statutory time period affecting such decision or order unless specifically so ordered by the Administrator.

(y) *Accelerated decision, dismissal.* (1) The Presiding Officer, upon motion of any party or sua sponte, may at any time render an accelerated decision in favor of the Agency or the manufacturer as to all or any part of the proceeding, without further hearing or upon such limited additional evidence such as affidavits as he may require, or dismiss any party with prejudice, for any of the following reasons:

(i) Failure to state a claim upon which relief can be granted, or direct or collateral estoppel;

(ii) The lack of any genuine issue of material fact, causing a party to be entitled to judgment as a matter of law; or

(iii) Such other and further reasons as are just, including specifically failure to obey a procedural order of the Presiding Officer.

(2) If under this paragraph an accelerated decision is issued as to all the issues and claims joined in the proceeding, the decision shall be treated for the purposes of these procedures as the decision of the Presiding Officer as provided in paragraph (s) of this section.

(3) If under this paragraph, judgment is rendered on less than all issues or claims in the proceeding, the Presiding Officer shall determine what material facts exist without substantial controversy and what material facts are actually and in good faith controverted. He shall thereupon issue an order specifying the facts which appear without substantial controversy, and the issues and claims upon which the hearing will proceed.

(z) *Conclusion of hearing.* (1) If, after the expiration of the period for taking an appeal as provided for by paragraphs (t) and (u) of this section, no appeal has been taken from the Presiding Officer's decision, and after the expiration of the period for review by the Administrator on his own motion as provided for by paragraph (v) of this section, the Administrator does not move to review such decision, the hearing will be deemed to have ended at the expiration of all periods allowed for such appeal and review.

(2) If an appeal of the Presiding Officer's decision is taken pursuant to paragraphs (t) and (u) of this section, or if, in the absence of such appeal the Administrator moves to review the decision of the Presiding Officer pursuant to paragraph (v) of this section, the hearing will be deemed to have ended upon rendering of a final decision by the Administrator.

(aa) *Judicial review.* (1) The Administrator hereby designates the General Counsel, Environmental Protection Agency as the officer upon whom copy of any petition for judicial review shall be served. Such officer shall be responsible for filing in the court the record on which the order of the Administrator is based.

(2) Before forwarding the record to the court, the Agency shall advise the petitioner of costs of preparing it and as soon as payment to cover fees is made, shall forward the record to the court.

6. Part 86 is amended by adding Appendix VIII as follows:

APPENDIX VIII—SAMPLING PLANS FOR SELECTIVE ENFORCEMENT AUDITING

TABLE I.—SAMPLE SIZE CODE LETTERS

Batch size	*Code letter*
4 to 8	A
9 to 15	B
16 to 25	C
26 and larger	D

TABLE II. - Sampling Plans for Inspecting Batches (40% AQL)

Sample size code letter	Test Sample	Test Sample Size	Cumulative Test Sample Size	Batch inspection criteria	
				Acceptance No.	Rejection No.
A	1st	3	3	1	2
B	1st	4	4	2	3
C	1st	3	3	0	3
	2nd	3	6	3	4
D	1st	2	2	0	(1)
	2nd	2	4	2	4
	3rd	2	6	3	4

1 Batch rejection not permitted at this sample size.

TABLE III. - Batch Sequence Plans (40% AQL)

Sample size code letter	No. Batches	Cumulative no. batches	Sequence Inspection Criteria	
			Acceptance No.	Rejection No.
A	2	2	0	(1)
	2	4	2	4
	2	6	4	5
B	2	2	0	2
	2	4	1	3
	2	6	2	3
C	2	2	0	2
	2	4	1	3
	2	6	2	4
	2	8	3	4
D	2	2	(2)	2
	2	4	0	3
	2	6	1	3
	2	8	2	4
	2	10	3	4

1/ Batch sequence rejection not permitted for this number of batches.

2/ Batch sequence acceptance not permitted for this number of batches.

7. Part 86 is amended by adding Appendix IX as follows:

APPENDIX IX—SELECTIVE ENFORCEMENT AUDITING TEST PROCEDURES

This appendix describes the test procedures which shall be used to determine conformity of test vehicles with the requirements of Subpart G of 40 CFR Part 86.

I. *Test procedures.* Vehicles shall be tested for conformity with following procedures:

(1) *Gasoline-fueled vehicles.* (i) The test consists of prescribed sequences of fueling, parking, and operating conditions. The exhaust gases generated during vehicle operation are diluted with air and sampled continuously for subsequent analysis of specific components by prescribed analytical techniques. The test applies to vehicles equipped with catalytic or direct-flame afterburners, induction system modifications, or other systems or to uncontrolled vehicles and engines.

(ii) The exhaust emission test is designed to determine hydrocarbon, carbon monoxide, and oxides of nitrogen mass emissions while simulating an average trip of 7.5 miles in an urban area. The test consists of engine start-ups and vehicle operation on a chassis dynamometer through a specified driving schedule, as described in Appendix I to 40 CFR Part 86. A proportional part of the diluted exhaust emissions is collected continuously, for subsequent analysis, using a constant volume (variable dilution) sampler.

(iii) Except in cases of component malfunction or failure, all emission control systems installed on or incorporated in a new motor vehicle shall be functioning during all procedures in this appendix.

(2) *Diesel vehicles.* (i) The test consists of prescribed sequences of fueling, parking, and operating conditions. The exhaust gases generated during vehicle operation are diluted with air and sampled continuously for analysis of Diesel exhaust hydrocarbons and subsequent analysis of other specific components by prescribed techniques. The test applies to vehicles equipped with catalytic or direct flame afterburners, other control systems or to uncontrolled vehicles and engines. All test phases are conducted within an ambient temperature range of 68° to 86° F.

(ii) The exhaust emission test is designed to determine hydrocarbon, carbon monoxide, and oxides of nitrogen mass emissions while simulating an average trip of 7.5 miles in an urban area. The test consists of engine start-ups and vehicle operation on a chassis dynamometer through a specified driving schedule, as described in Appendix I to 40 CFR Part 86. Using a constant volume (variable dilution) sampler, a proportional part of the diluted exhaust gas is analyzed continuously for hydrocarbons and an additional proportional part of the diluted exhaust gas is collected in bags for subsequent analysis of the other components.

(iii) Except for component malfunction or failure, all emission control systems installed on or incorporated in a new motor vehicle shall be functioning during all procedures in this subpart.

II. *Fuel specifications*—(a) *Gasoline.* (1) Gasoline having the following specifications will be used by the Administrator in exhaust emission testing.

Gasoline having the following specifications or substantially equivalent specifications approved by the Administrator, shall be used by the manufacturer in testing.

Item designation	ASTM	Leaded	Unleaded
Octane, research, minimum	D1656	100	96
Pb. (organic), grams/U.S. gallon		11.4	0.00-0.05
Distillation range:			
IBP[1], °F	D86	75.95	75-95
10 percent point, °F	D86	120-135	120-135
50 percent point, °F	D86	200-230	200-230
90 percent point, °F	D86	300-325	300-325
EP, F (maximum)	D86	415	415
Sulphur, weight percent, maximum	D1266	0.10	.10
Phosphorus, grams/U.S. gallon, maximum		.01	.005
RVP[2], pounds	D323	8.0-9.2	8.0-9.2
Hydrocarbon composition			
Olefins, percent, maximum	D1319	10	10
Aromatics, percent, maximum	D1319	35	35
Saturates	D1319	Remainder	Remainder

1/ For testing at altitudes above 1,219 meters (4,000) the specified range is 73-105.

2/ For testing at altitudes above 1,219 meters (4,000 feet) the specified range is 7.9-9.2.

(2) Gasoline representative of commercial gasoline which will be generally available through retail outlets shall be used in mileage accumulation. For unleaded gasoline the minimum lead content shall be 0.02 grams per U.S. gallon and the minimum phosphorus content shall be 0.002 grams per U.S. gallon. For leaded gasoline, the minimum lead content shall be 1.4 grams per U.S. gallon, except that where the Administrator determines that vehicles represented by a test vehicle will be operated using gasoline of different lead content than that prescribed in this paragraph, he may consent in writing to use of a gasoline with a different lead content. The octane rating of the gasoline used shall be no higher than 4.0 research octane numbers above the minimum recommended by the manufacturer. The Reid Vapor Pressure of the gasoline used shall be characteristic of the motor fuel during the season which the mileage accumulation takes place.

(3) The specification range of the gasoline used under paragraph (a)(2) of this section shall be recorded.

(b) *Diesel fuel.* (1) The diesel fuels employed for testing shall be clean and bright, with pour and cloud points adequate for operability. The diesel fuel may contain nonmetallic additives as follows: Cetane improver, metal deactivator, antioxidant, dehaser, antitrust, pour depressant, dye, and dispersant.

(2) Diesel fuel meeting the following specifications, or substantially equivalent specifications approved by the Administrator, shall be used in exhaust emissions testing: The grade of diesel fuel recommended by the engine manufacturer commercially designated as "Type 1-D" or "Type 2-D", shall be used.

(3) Other petroleum distillation fuel specifications:

(i) Other petroleum distillate fuels may be used for testing and service accumulation provided they are commercially available, and

(ii) Information, acceptable to the Administrator, is provided to show that only the designated fuel would be used in customer service, and

(iii) Use of a fuel listed under paragraphs (b)(1) and (b)(2) of this section would have a detrimental effect on emissions or durability, and

(iv) Written approval from the Administrator of the fuel specifications was provided prior to the start of testing.

(4) The specification range of the fuels used under paragraphs (b)(1), (b)(2), and (b)(3) of this section shall be recorded.

III. *Gasoline-fueled vehicle preparation.* Gasoline-fueled vehicles to be tested in accordance with this appendix shall be prepared as follows:

(1)(i) Inspect the fuel system carefully to insure the absence of any leaks to the atmosphere of either liquid or vapor which might affect the accuracy of the test or the performance of the control system. Such inspection shall include the application of a pressure of 14.5 inches of water (plus or minus 0.5 inches of water) to the fuel system. The pressure should be applied and alowed to stabilize and the fuel system isolated from the pressure source. The fuel system may not lose more than 2.0 inches of water in five minutes beginning with the isolation of the fuel system. Corrective action, if required, shall be performed in accordance with § 86.608(e) and be reported with the final test report under § 86.609(e).

(ii) Care should be exercised, in the application of any pressure tests, neither to purge nor load the evaporative emission control system.

IV. *Vehicle preconditioning.* (a) Gasoline-fueled vehicles to be tested in accordance with this appendix shall be preconditioned as follows:

(1)(i) The fuel tank(s) shall be drained and filled with the specified test fuel (II.(a)(1)) to 40 percent of nominal capacity, rounded to the nearest whole U.S. gallon; or,

(ii) The fuel line from the tank(s) shall be clamped and disconnected from the fuel pump. A line from a "slave" tank, filled with specified test fuel, shall be connected to the fuel pump. If the fuel pump is equipped with a fuel return line, it shall be disconnected from the vehicle tank(s) and connected to the "slave" tank. The "slave" tank shall deliver fuel to the fuel pump at approximately neutral pressure. The vehicle fuel tank(s) shall be filled with either test fuel or fuel used during mileage accumulation to 40 percent of nominal capacity, rounded to the nearest whole U.S. gallon. Except as modified by this section, all connections within the evaporative emissions control system shall remain intact.

(2) The fuel added to the vehicle tank(s) or in the "slave" tank shall have an initial temperature of no more than 86° F. The evaporative emission control system or device shall not be abnormally purged or loaded as a result of draining or filling the tank(s) or connecting the "slave" tank.

(3) The test vehicle shall be placed on the dynamometer and operated over a simulated trip, according to the requirements of Sections V through XIII of this appendix. The engine need not be cold when starting the run on the dynamometer and a single trip of 7.5 miles shall be made. Longer preconditioning may be permitted with advance approval of the Administrator. The test vehicle shall not be used to set dynamometer horsepower. During this operation the ambient temperature shall be between 68° F and 86° F.

(4) The engine and cooling fan shall be stopped upon completion of the dynamometer operation and the vehicle permitted to soak either on or off the dynamometer stand at an ambient temperature between 76° F and 86° F for a period of not less than one hour.

(5) The test vehicle shall then be allowed to soak in an area where the ambient temperature is maintained between 60° F and 86° F for a period of not less than 11 (eleven) hours prior to the dynamometer operation prescribed in sections V through XIII of this appendix.

(b) Diesel vehicles to be tested in accordance with this appendix shall be preconditioned as follows:

(1)(i) The fuel tank(s) of each test vehicle shall be filled with specified test fuel (II.(b)(1)) to 40 percent of nominal capacity, rounded to the nearest whole U.S. gallon; or,

(ii) The fuel line from the tank(s) shall be clamped and disconnected from the fuel pump. A line from a "slave" tank, filled with specified test fuel, shall be connected to the fuel pump. If the fuel pump is equipped with a fuel return line, it shall be disconnected from the vehicle tank(s) and connected to the "slave" tank. The "slave" tank shall deliver fuel to the fuel pump at approximately neutral pressure. The vehicle fuel tank(s) shall be filled with specified test fuel to 40 percent of nominal capacity, rounded to the nearest whole U.S. gallon.

(2) The test vehicle shall be placed on the dynamometer and operated over a simulated trip, according to the requirements of Sections V through XIII of this appendix. The engine need not be cold when starting the run on the dynamometer and a single trip of 7.5 miles shall be made. The test vehicle shall not be used to set dynamometer horsepower.

(3) The engine and cooling fan shall be stopped upon completion of the dynamometer operation and the vehicle permitted to soak either on or off the dynamometer stand for a period of not less than 12 hours prior to the dynamometer test.

V. *Dynamometer driving schedule.* (a) The dynamometer driving schedule to be followed consists of a nonrepetitive series of idle, acceleration, cruise, and deceleration modes

of various time sequences and rates. The driving schedule is defined by a smooth transition through the speed vs. time relationships listed in Appendix I of 40 CFR Part 86. The time sequence begins upon starting the vehicle according to the startup procedure described in Section X of this appendix.

(b) The speed tolerance at any given time on the dynamometer driving schedule prescribed in Appendix I or as plotted on a driver's aid chart approved by the Administrator, when conducted to meet the requirements of Section VI of this appendix, is defined by upper and lower limits. The upper limit is 2 m.p.h. higher than the highest point on the trace within 1 second of the given time. The lower limit is 2 m.p.h. lower than the lowest point on the trace within 1 second of the given time. Speed variations greater than the tolerances (such as occur when shifting manual transmission vehicles) are acceptable provided they occur for less than 2 seconds on any one occasion. Speeds lower than those prescribed are acceptable provided the vehicle is operated at maximum available power during such occurrences. Further, speed deviations from those prescribed due to stalling are acceptable provided the provisions of Section X(d) are adhered to. When conducted to meet the requirements of Section IV, the speed tolerance shall be as specified above, except that the upper and lower limits shall be 4 m.p.h.

VI. *Dynamometer procedure.* (a) The dynamometer run consists of two tests, a "cold" start test after a minimum 12-hour soak (according to the provisions of Section IV of this appendix) and a "hot" start test with a 10-minute soak between the two tests. Engine startup (with all accessories turned off), operation over the driving schedule, and engine shutdown make a complete cold start test. Engine startup and operation over the first 505 seconds of the driving schedule complete the hot start test. The exhaust emissions are diluted with air to a constant volume and a portion is sampled continuously during each test. (Diesel hydrocarbons are analyzed continuously.) The composite (flow integrated) samples collected in bags are analyzed for hydrocarbons (except Diesel), carbon monoxide, carbon dioxide, and oxides of nitrogen. A parallel sample of the dilution air is similarly analyzed for hydrocarbon, carbon monoxide, and oxides of nitrogen.

(b) During dynamometer operation, a fixed speed cooling fan shall be positioned so as to direct cooling air to the vehicle in an appropriate manner with the engine compartment cover open. The fan capacity shall normally not exceed 5,300 c.f.m. If, however, the manufacturer can show that during field operation the vehicle receives additional cooling, the fan capacity may be increased or additional fans used if approved in advance by the Administrator. In the case of vehicles with front engine compartments, the fan(s) shall be squarely positioned between 8 and 12 inches in front of the cooling air inlets (grill). In the case of vehicels with rear engine compartments (or if special designs make the above impractical), the cooling fan(s) shall be placed in a position to provide sufficient air to maintain engine cooling.

(c) The vehicle shall be nearly level when tested in order to prevent abnormal fuel distribution.

(d) Flywheels, electrical or other means of simulating inertia as shown in the following table shall be used. If the equivalent inertia specified is not available on the dynamometer being used, the next higher equivalent inertia (not to exceed 250 lbs.) available shall be used.

Loaded vehicle weight, pounds	Equivalent interia weight, pounds	Road load power at 50 m.p.h., horsepower
Up to 1,125	1,000	5.9
1,126 to 1,375	1,250	6.5
1,376 to 1,625	1,500	7.1
1,626 to 1,875	1,750	7.7
1,876 to 2,125	2,000	8.3
2,126 to 2,375	2,250	8.8
2,376 to 2,625	2,500	9.4
2,626 to 2,875	2,750	9.9
2,876 to 3,250	3,000	10.3
3,251 to 3,750	3,500	11.2
3,751 to 4,250	4,000	12.0
4,251 to 4,750	4,500	12.7
4,751 to 5,250	5,000	13.4
5,251 to 5,750	5,500	13.9
5,751 to above	5,500	14.4

(e) Power absorption unit adjustment.

(1) The power absorption unit shall be adjusted to reproduce road load power at 50 m.p.h. true speed. The indicated road load power setting shall take into account the dynamometer friction.

The relationship between road load (absorbed) power and indicated road load power for a particular dynamometer shall be determined by the procedure outlined in Appendix II of 40 CFR Part 86 or other suitable means.

(2) The road load power listed in the table above shall be used or the vehicle manufacturer may determine the road load power by an alternate procedure requested by the manufacturer and approved in advance by the Administrator, or the vehicle manufacturer may determine the road load power by the following procedure and request its use:

(i) *Gasoline-fuel vehicles.* (A) Measuring the absolute manifold pressure of a representative vehicle, of the same equivalent inertia weight class, when operated on a level road under balanced wind conditions at a true speed of 50 m.p.h., and

(B) Noting the dynamometer indicated road load horsepower setting required to reproduce that manifold pressure when the same vehicle is operated on the dynamometer at a true speed of 50 m.p.h. The tests on the road and on the dynamometer shall be performed with the same vehicle ambient absolute (usually barometric), i.e., within ±5 mm. Hg.

(ii) *Diesel vehicles.* (A) Measuring the fuel flow rate of a representative vehicle of the same equivalent inertia weight class, when operated on a level road under balanced wind conditions at a true speed of 50 m.p.h., and

(B) Noting the dynamometer indicated road load horsepower setting required to reproduce that fuel flow rate when the same vehicle is operated on the dynamometer at a true speed of 50 m.p.h. The tests on the road and on the dynamometer shall be performed with the same vehicle ambient absolute pressure (usually barometric), i.e. within ±5 mm. Hg.

(3) The road load power shall be adjusted according to the following if applicable:

(i) Where it is expected that more than 33 percent of the vehicles in an engine family will be equipped with air conditioning, the road load power listed above or as determined in paragraph (e)(2) of this section shall be increased by 10 percent for testing all test vehicles representing such engine family if those vehicles are intended to be offered with air conditioning in production.

(f) The vehicle speed (m.p.h.) as measured from the dynamometer rolls shall be used for all conditions. A speed vs. time recording, as evidence of dynamometer test validity, shall be supplied on request of the Administrator.

(g) Practice runs over the prescribed driving schedule may be performed at test points, provided an emission sample is not taken, for the purpose of finding the minimum accelerator pedal action to maintain the proper speed-time relationship, or to permit sampling system adjustments to comply with Section XI(a)(2)(ii) or Section XI(b)(2)(ii).

NOTE.—When using two-roll dynamometers a truer speed-time trace may be obtained by minimizing the rocking of the vehicle in the rolls. The rocking of the vehicle changes the tire rolling radius on each roll. The rocking may be minimized by restraining the vehicle horizontally (or nearly so) by using a cable and winch.

(h) The drive wheel tires may be inflated up to 45 p.s.i.g. in order to prevent tire damage. Slave tires may be substituted for the drive wheel tires with which the vehicle is equipped provided they are the same size. The drive wheel tire pressure shall be recorded.

(i) If the dynamometer has not been operated during the 2-hour period immediately preceding the test it shall be warmed up for 15 minutes by operating it at 30 m.p.h. using a nontest vehicle.

(j) If the dynamometer horsepower must be adjusted manually, it shall be set within 1 hour prior to the exhaust emissions test. The test vehicle shall not be used to make this adjustment. Dynamometers using automatic control of preselectable power settings may be set anytime prior to the beginning of the test.

VII. *Three-speed manual transmissions.* (a) All test conditions except as noted shall be run in highest gear.

(b) Cars equipped with free wheeling or overdrive units shall be tested with this unit (free wheeling or overdrive) locked out of operation.

(c) Idle shall be run with transmission in gear and with clutch disengaged (except first idle; see Section X).

(d) The vehicle shall be driven with minimum accelerator pedal movement to maintain the desired speed.

(e) Acceleration modes shall be driven smoothly with the shift speeds as recommended by the manufacturer. If the manufacturer does not recommend shift speeds, the vehicle shall be shifted from first to second gear at 15 m.p.h. and from second to third gear at 25 m.p.h. The operator shall release the accelerator pedal during the shift, and accomplish the shift with minimum closed throttle time. If the vehicle cannot accelerate at the specified rates, the vehicle shall be operated with accelerator pedal fully depressed until the vehicle speed reaches the speed at which it should be at that time during the test.

(f) The deceleration modes shall be run with clutch engaged and without shifting gears from the previous mode, using brakes or accelerator pedal as necessary to maintain the desired speed. For those modes which decelerate to zero, the clutch shall be depressed when the speed drops below 15 m.p.h., when engine roughness is evident, or when engine stalling is imminent.

(g) Downshifting is allowed at the beginning of or during a power mode if recommended by the manufacturer or if the engine obviously is lugging.

VIII. *Four-speed and five-speed manual transmissions.* (a) Use the same procedure as for three-speed manual transmissions for shifting from first to second gear and from second to third gear. If the manufacturer does not recommend shift speeds, the vehicle shall be shifted from third to fourth gear at 40 m.p.h. Fifth gear may be used at the manufacturer's option.

(b) If transmission ratio in first gear exceeds 5:1, follow the procedure for three- or four-speed manual transmission vehicles as if the first gear did not exist.

IX. *Automatic transmissions.* (a) All test conditions shall be run with the transmission in "Drive" (highest gear). Automatic stick-shift transmissions may be shifted as manual transmissions at the option of the manufacturer.

(b) Idle modes shall be run with the transmission in "Drive" and the wheels braked (except first idle; see Section X).

(c) The vehicle shall be driven with minimum accelerator pedal movement to maintain the desired speed.

(d) Acceleration modes shall be driven smoothly allowing the transmission to shift automatically through the normal sequence of gears. If the vehicle cannot accelerate at the specified rates, the vehicle shall be operated with accelerator pedal fully depressed until the vehicle speed reaches the speed at which it should be at that time during the driving schedule.

(e) The deceleration modes shall be run in gear using brakes or accelerator pedal as necessary to maintain the desired speed.

X. *Engine starting and restarting*—(a) *Gasoline-fueled vehicles.* (1) The engine shall be started according to the manufacturer's recommended starting procedures. The initial 20-second idle period shall begin when the engine starts.

(2) *Choke operation.* (i) Vehicles equipped with automatic chokes shall be operated according to the instructions which will be included in the manufacturer's operating instructions or owner's manual including choke setting and "kick-down" from cold fast idle. The transmission shall be placed in gear 15 seconds after the engine is started. If necessary, braking may be employed to keep the drive wheels from turning.

(ii) Vehicles equipped with manual chokes shall be operated according to the manufacturer's operating instructions or owner's manual.

(3) The operator may use the choke, accelerator pedal, etc. where necessary to keep the engine running.

(4) If the manufacturer's operating or owner's manual does not specify a warm engine starting procedure, the engine (automatic and manual choke engines) shall be started by depressing the accelerator pedal about half way and cranking the engine until it starts.

(b) *Diesel vehicles.* (1) The engine shall be started according to the manufacturer's recommended starting procedures. The initial 20-second idle period shall begin when the engine starts. The transmission shall be placed in gear 15 seconds after the engine is started. If necessary, braking may be employed to keep the drive wheels from turning.

(c) If the vehicle does not start after 10 seconds of cranking, cranking shall cease and the reason for failure to start shall be determined. The revolution counter on the constant volume sampler (and the hydrocarbon integrator when testing Diesel vehicles, see Section XIII), shall be turned off and the sample solenoid valves placed in the "dump" position during this diagnostic period. In addition, either the positive displacement pump should be turned off or the exhaust tube disconnected from the tailpipe during the diagnostic period. If failure to start is an operational error, the vehicle shall be rescheduled for testing from a cold start. If failure to start is caused by vehicle malfunction, corrective action of less than 30 minutes duration may be taken and the test continued. The sampling system shall be reactivated at the same time cranking is started. When the engine starts, the driving schedule timing sequence shall begin. If failure to start is caused by vehicle malfunction and the vehicle cannot be started, the test shall be voided, corrective action taken, and the vehicle rescheduled for test. The reason for the malfunction (if determined) and the corrective action taken shall be reported.

(d) If the engine "false starts", the operator shall repeat the recommended starting procedure (such as resetting the choke, etc.)

(e) Stalling:

(f) If the engine stalls during an idle period, the engine shall be restarted immediately and the test continued. If the engine cannot be started soon enough to allow the vehicle to follow the next acceleration as prescribed, the driving schedule indicator shall be stopped. When the vehicle restarts the driving schedule indicator shall be reactivated.

(2) If the engine stalls during some operating mode other than idle, the driving schedule indicator shall be stopped, the vehicle restarted, accelerated to the speed required at that point in the driving schedule and the test continued.

(3) If the vehicle will not restart within 1 minute, the test shall be voided, corrective action taken, and the vehicle rescheduled for test. The reason for the malfunction (if determined) and the corrective action taken shall be reported.

XI. *Sampling and analytical system (exhaust emissions)*—(a) *Gasoline-fueled vehicles.* The sampling and analytical systems for gasoline-fueled vehicles shall comply with paragraph (a) of this section:

(1) *Schematic drawings.* The following figures (Figs. 1 and 2) are schematic drawings of the exhaust gas sampling and analytical systems which will be used for testing under the regulations in this part. Since various configurations of the required components can produce accurate results, these schematic drawings are not to be interpreted literally and exact conformance is not mandatory. Additional components such as instruments, valves, solenoids, pumps, and switches may be used to provide additional information and coordinate the functions of the component systems.

(2) *Component description (exhaust gas sampling system).* The following components will be used in the exhaust gas sampling systems for testing under the regulations in this subpart. See figure 1. Other types of constant volume samplers may be used if shown to yield equivalent results and if approved in advance by the Administrator.

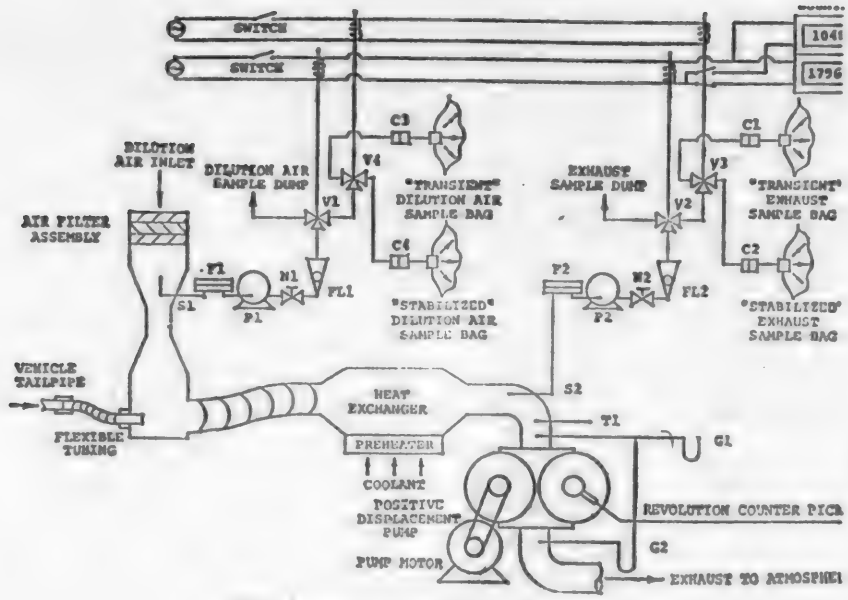

Figure 1 - Exhaust Gas Sampling System

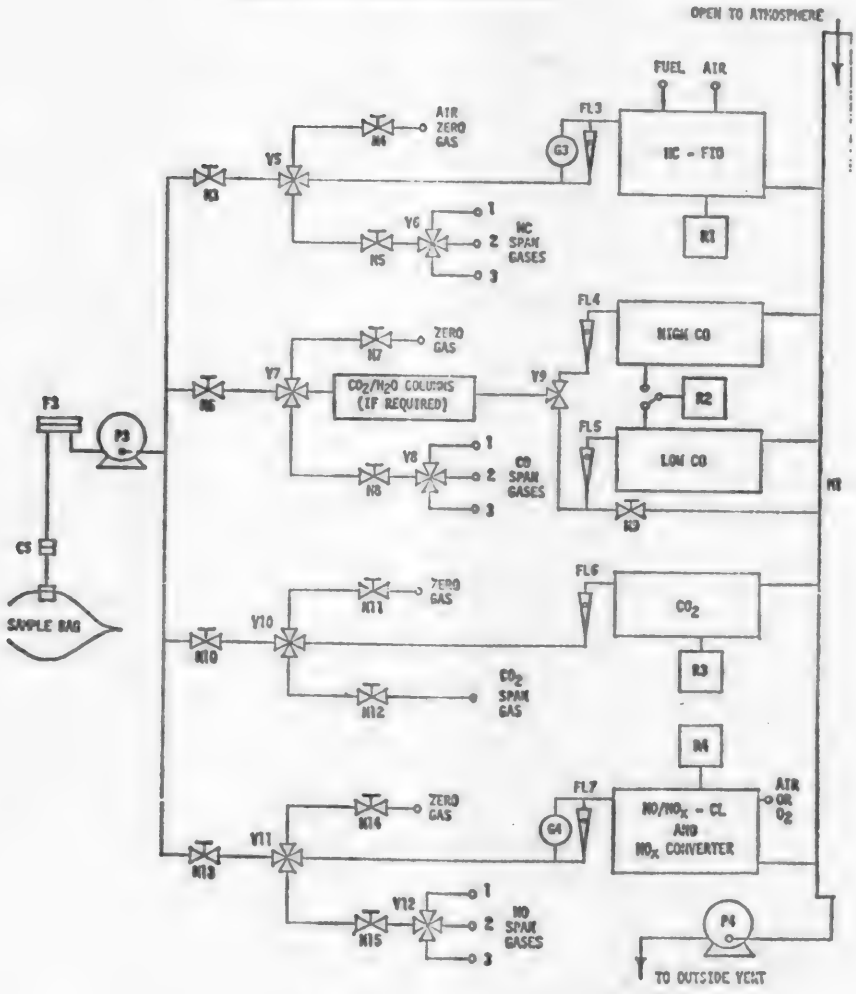

Figure 2 Exhaust Gas Analytical System

(i) A dilution air filter assembly consisting of a particulate (paper) filter to remove solid matter from the dilution air and thus increase the life of the charcoal filter; a charcoal filter to reduce and stabilize the background hydrocarbon level; and a second particulate filter to remove charcoal particles from the air stream.

(ii) A leak-tight connector and tube to the vehicle tailpipe. The tubing shall be sized and connected in such a manner that the static pressure variations in the vehicle tailpipe(s) remain within ±5 inches of water of the static pressure variations measured during a dynamometer driving cycle with no connection to the tailpipe(s). Sampling systems capable of tolerances of ±1 inch of water will be used by the Administrator if a written request by the manufacturer substantiates the need for this closer tolerance.

(iii) A heating system to preheat exchanger to within ±10° F of its operating temperature before the test begins.

(iv) A heat exchanger capable of limiting the gas mixture temperature variation during the entire test to ±10° F as measured at a point immediately ahead of the positive displacement pump.

(v) A positive displacement pump to pump the dilute exhaust mixture. The pump capacity (300 to 350 c.f.m. is sufficient for testing most vehicles) shall be large enough to virtually eliminate water condensation in the system. (See Appendix III of 40 CFR Part 86 for one flow calibration technique.) Other suitable caliberation techniques may be used if approved in advance by the Administrator.

(vi) Temperature sensor (T1) with an accuracy of ±2° F to allow continuous recording of the temperature of the dilute exhaust mixture entering the positive displacement pump.

(vii) Gauge (G1) with an accuracy of ±3 mm. Hg to measure the pressure depression of the dilute exhaust mixture entering the positive displacement pump, relative to atmospheric pressure.

(viii) Gauge (G2) with an accuracy of ±3 mm. Hg to measure the pressure increase across the positive displacement pump.

(ix) Sample probes (S1 and S2) pointed upstream to collect samples from the dilution airstream and the dilute exhaust mixture.

(x) Filters (F1 and F2) to remove particulate matter from dilution air and dilute exhaust samples.

(xi) Pumps (P1 and P2) to pump the dilution air and dilute exhaust into their respective sample collection bags.

(xii) Flow control valves (N1 and N2) to regulate flows to sample collection bags, at constant flow rates. The minimum sample flow rate shall be 10 c.f.h.

(xiii) Flowmeters (FL1 and FL2) to insure, by visual observation, that constant flow rates are maintained throughout the test.

(xiv) Three-ways solenoid valves (V1, V2, V3, and V4) to direct sample streams to either their respective bags or overboard.

(xv) Quick-connect, leak-tight fittings (C1, C2, C3, and C4) with automatic shutoff on bag side to attach sample bags to sample system.

(xvi) Sample collection bags for dilution air and exhaust samples of sufficient capacity so as not to impede sample flow.

(xvii) Revolution counters to count the revolutions of the positive displacement pump while each test phase is in progress and samples are being collected.

(3) Component description (exhaust gas analytical system). The following components will be used in the exhaust gas analtical system for testing under the regulations in this part. The analytical system provides for the determination of hydrocarbon concentrations by flame ionization detector (FID) analysis, the determination of carbon monoxide and carbon dioxide concentrations by nondispersive infrared (NDIR) analysis and the determination of oxides of nitrogen concentrations by chemiluminescence (CL) analysis in dilute exhaust samples. The chemiluminescence method of analysis requires that the nitrogen dioxide present in the sample be converted to nitric oxide before analysis. (See Appendix V of 40 CFR Part 86.) Other types of analyzers may be used if shown to yield equivalent results and if approved in advance by the Administrator. (See Figure 2.)

(i) Quick-connect leak-tight fittig (C5) to attach sample bags to analytical system.

(ii) Filter (F3) to remove any residual particulate matter from the collected sample.

(iii) Pump (P3) to transfer samples from the sample bags to the analyzers.

(iv) Selector valves (V5, V6, V7, V8, V9, V10, V11, and V12) for directing samples, span gases or zeroing gases to the analyzers.

(v) Flow control valves (N3, N4, N5, N6, N7, N8, N9, N10, N11, N12, N13, N14, and N15) to regulate the gas flow rates.

(vi) Flowmeters (FL3, FL4, FL5, FL6, and FL7) to indicate gas flow rates.

(vii) Pressure gauges (G3 and G4) to facilitate greater precision in setting and reading flow rates.

(viii) Manifold (M1) to collect the expelled gases from the analyzers.

(ix) Pump (P4) to transfer expelled gases from the collection manifold to a vent external to the test room (optional).

(x) Analyzers to determine hydrocarbon, carbon monoxide, carbon dioxide and oxides of nitrogen concentrations. (See Section XII (a).)

(xi) Sample conditioning column containing $CaSO_4$ or indicating silica gel to remove water vapor and containing ascarite to remove carbon dioxide from the CO analysis stream.

NOTE.—If CO instruments which are essentially free of CO_2 and water vapor interference are used, the use of the conditioning column may be deleted.

A CO instrument will be considered to be essentially free of CO_2 and water vapor interference if its response to a mixture of 3 percent CO_2 and N_2, which has been bubbled through water at room temperature (68°–86° F), produces an equivalent CO response, as measured on the most sensitive CO range, which is less than 1 percent of full scale CO concentration on instrument ranges above 300 ppm CO or less than 3 ppm on instrument ranges below 300 ppm CO.

(xii) Recorders (R1, R2, R3, and R4) or digital printers to provide permanent records of calibration, spanning and sample measurements; or in those facilities where computerized data acquisition systems are incorporated, the computer facility printout may be used.

(b) *Diesel vehicles*—(1) *Schematic drawings.* The following figures 3, 4, and 5 are schematic drawings of the exhaust gas sampling and analytical systems which will be used for testing under the regulations in this part. Since various configurations of the required components can produce accurate results, these schematic drawings are not to be interpreted literally and exact conformance is not mandatory. Additional components such as instruments, valves, solenoids, pumps, and switches may be used to provide additional information and coordinate the functions of the component systems.

(2) Component description (exhaust gas sampling system). The following components will be used in the exhaust gas sampling system for testing under the regulations in this part. (See Figure 3.) Other types of constant volume samplers may be used if shown to yield equivalent results, and if approved in advance by the Administrator.

(i) A dilution air filter assembly consisting of a particulate (paper) filter to remove solid matter from the dilution air and thus increase the life of the charcoal filter; a charcoal filter to reduce and stabilize the background hydrocarbon level; and a second particulate filter to remove charcoal particles from the air stream.

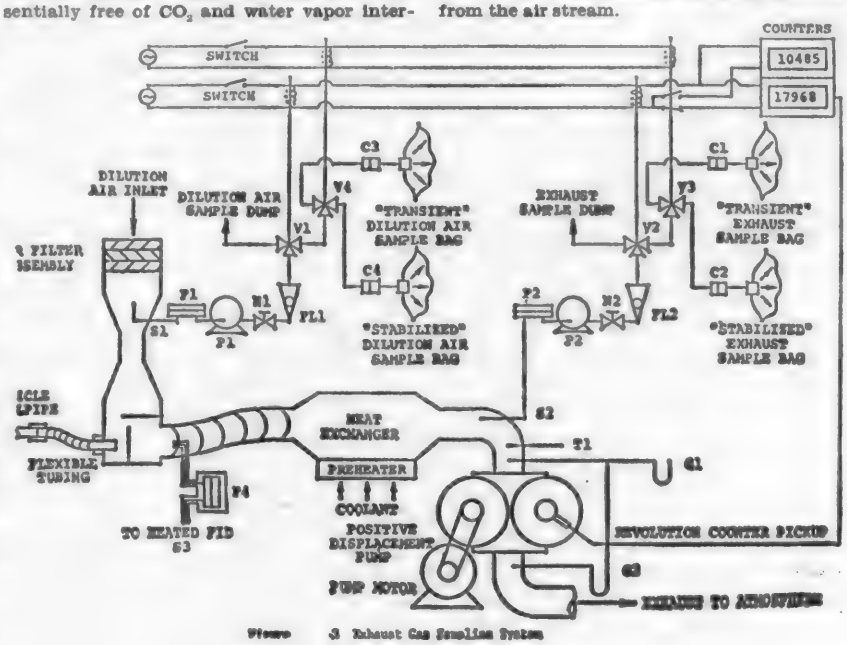

Figure 3 Exhaust Gas Sampling System

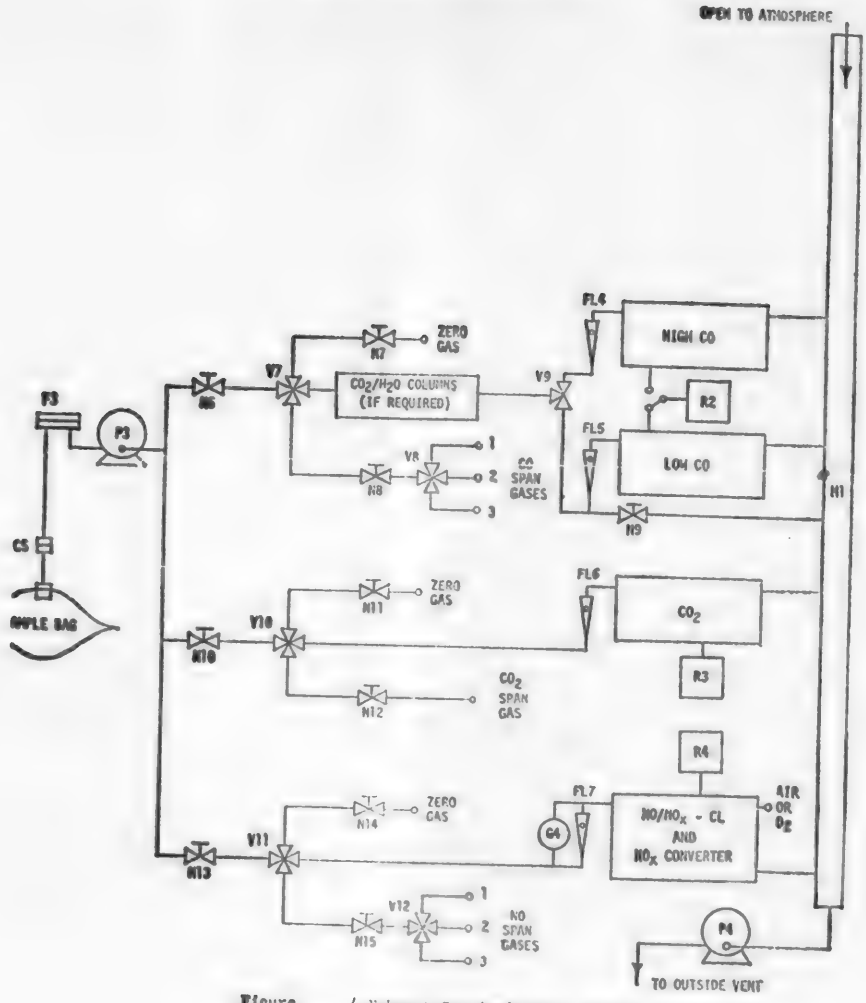

Figure 4 Exhaust Gas Analytical System

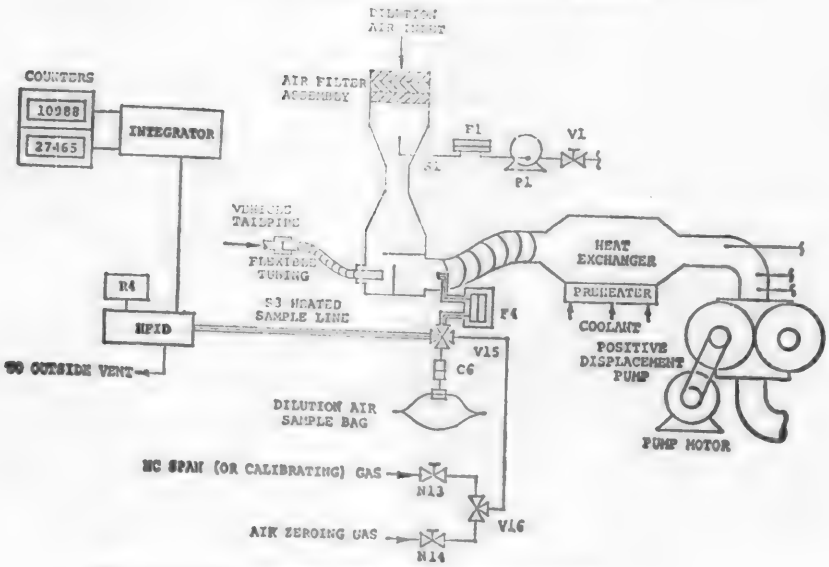

Figure 5 Diesel Hydrocarbon Continuous Analysis System

(ii) A leak-tight connector and tube to the vehicle tailpipe. The tubing shall be sized and connected in such a manner that the static pressure variations in the vehicle tailpipe(s) remain within ±5 inches of water of the static pressure variations measured during a dynamometer driving cycle with no connection to the tailpipe(s). Sampling systems capable of tolerances of ±1 inch of water will be used by the Administrator if a written request by the manufacturer substantiates the need for this closer tolerance.

(iii) A heating system to preheat the heat exchanger to within ±10° F of its operating temperature before the test begins.

(iv) A heat exchanger capable of limiting the gas mixture temperature variation during the entire test to ±10° F as measured at a point immediately ahead of the positive displacement pump.

(v) A positive displacement pump to pump dilute exhaust mixture. The pump capacity (300 to 350 c.f.m. is sufficient for testing most vehicles) shall be large enough to virtually eliminate water condensation in the system. See Appendix III to 40 CFR 86 for one flow calibration technique. Other suitable calibration techniques may be used if approved in advance by the Administrator.

(vi) Temperature sensor (T1) with an accuracy of ±2° F to allow continuous recording of the temperature of the dilute exhaust mixture entering positive displacement pump.

(vii) Gage (G1) with an accuracy of ±3 mm. Hg to measure the pressure depression of the dilute exhaust mixture entering the positive displacement pump, relative to atmospheric pressure.

(viii) Gage (G2) with an accuracy of ±3 mm. Hg to measure the pressure increase across the positive displacement pump.

(ix) Sample probes (S1, S2, and S3) pointed upstream to collect samples from the dilution air steam and the dilute exhaust mixture. Additional sample probes may be used, for example, to obtain continuous concentration traces of the dilute exhaust stream. In such case the sample flow rate, in standard cubic feet per test phase, must be added to the calculated dilute exhaust volume. The position of the sample probes in Figure 3 is pictorial only. The heated sample line (S3) between the sampling point and the analyzer shall be as short as possible.

(x) Filters (F1 and F2) to remove particulate matter from dilution air and dilute exhaust samples.

(xi) Pumps (P1 and P2) to pump the dilution air and dilute exhaust into their respective sample collection bags.

(xii) Flow control valves (N1 and N2) to regulate flows to sample collection bags, at constant flow rates. The minimum sample flow rate shall be 10 c.f.h.

(xiii) Flowmeters (FL1 and FL2) to insure, by visual observation, that constant flow rates are maintained throughout the test.

(xiv) Three-way solenoid valves (V1, V2, V3, and V4) to direct sample streams to either their respective bags or overboard.

(xv) Quick-connect, leak-tight fittings (C1, C2, C3, and C4) with automatic shutoff on bag side to attach sample bags to sample system.

(xvi) Sample collection bags for dilution air and exhaust samples of sufficient capacity so as not to impede sample flow.

(xvii) Revolution counters to count the revolutions of the positive displacement pump while each test phase is in progress and samples are being collected.

(3) Component description (exhaust gas batch analytical system). The following components will be used in the exhaust gas batch analytical system for testing under the regulations in this part. The analytical system provides for the determination of carbon monoxide and carbon dioxide concentrations by nondispersive infrared (NDIR) analysis and the determination of oxides of nitrogen concentrations by chemiluminescence (CL) analysis in dilute exhaust samples. The chemiluminescence method of analysis requires that the nitrogen dioxide present in the sample be converted to nitric oxide before analysis. Other types of analyzers may be used if shown to yield equivalent results and if approved in advance by the Administrator. (See Figure 4.)

(i) Quick-connect, leak-tight fitting (C5) to attach sample bags to analytical system.

(ii) Filter (F3) to remove any residual particulate matter from the collected sample.

(iii) Pump (P3) to transfer samples from the sample bags to the analyzers.

(iv) Selector valves (V7, V8, V9, V10, V11, and V12) for directing samples, span gases or zeroing gases to the analyzers.

(v) Flow control valves (N6, N7, N8, N9, N10, N11, N12, N13, N14, and N15) to regulate the gas flow rates.

(vi) Flowmeters (FL4, FL5, FL6, and FL7) to indicate gas flow rates.

(vii) Pressure gauge (G4) to facilitate greater precision in setting and reading flow rate.

(viii) Manifold (M1) to collect the expelled gases from the analyzers.

(ix) Pump (P4) to transfer expelled gases from the collection manifold to a vent external to the testroom (optional).

(x) Analyzers to determine carbon monoxide, carbon dioxide and oxides of nitrogen concentrations.

(xi) Sample conditioning column containing $CaSO_4$, or indicating silica gel to remove water vapor and containing ascraite to remove carbon dioxide from the CO analyses stream.

NOTE.—If CO instruments which are essentially free of CO_2 and water vapor interference are used, the use of the conditioning column may be deleted.

A CO instrument will be considered to be essentially free of CO_2 and water vapor interference if its response to a mixture of 3 percent CO_2 in N_2, which has been bubbled through water at room temperature (68°–86° F), produces an equivalent CO response, as measured on the most sensitive CO range, which is less than 1 percent of full scale CO concentration on instrument ranges above 300 ppm CO or less than 3 ppm on instrument ranges below 300 ppm CO.

(xii) Recorders (R1, R2, and R3) or digital printers to provide permanent records of calibration, spanning and sample measurements; or in those facilities where computerized data acquisition systems are incorporated, the computer facility printout may be used.

(4) Component description (exhaust gas continuous analytical system). The following components will be used in the exhaust gas continuous analytical system for testing under the regulations in this part. This analytical system provides for the continuous determination of exhaust hydrocarbon concentration by heated flame ionization detector (HFID) analysis. Other types of analyzers may be used if shown to yield equivalent results and if approved in advance by the Administrator (See Figure 5.)

(i) Heated continuous sampling line (S3).

(ii) Heated filter (F4) to remove particulate matter from heated hydrocarbon sample.

(iii) Selector valves (V5 and V6) for directing the continuous dilute exhaust sample, dilution air bag sample, span or zeroing gases to the analyzers.

(iv) Quick-connect, leak-tight fitting (C6) to attach dilution air sample bag to analytical system.

(v) Heated hydrocarbon analyzer (HFID) complete with heated pump, filter, and flow control system. The response time of this instrument shall be less than 1 second for 90 percent of full scale response. Sample transport time from sampling point to inlet of instrument shall be less than 4 seconds.

(vi) Chart recorder (R1) and analog integrator with two readouts, or chart recorder (R1) and on-line digital computer for manual or electronic integration of analyzer output signal during the three operating phases of the test.

(vii) Flow control valves (N4 and N5) to regulate the gas flow rates.

XII. *Analytical system calibration and sample handling.* (a) Calibrate the analytical assembly at least once every 30 days. Use the same flow rate as when analyzing samples.

(1) Adjust analyzers to optimize performance. For Diesel vehicles, operate the heated hydrocarbon analyzer, sampling line and filter to ±10° F in the temperature range of 300° to 390° F.

(2) Zero the hydrocarbon analyzer with zero grade air and the carbon monoxide, carbon dioxide, and oxides of nitrogen analyzers with zero grade air or zero grade nitrogen. The allowable zero gas impurity concentrations should not exceed 1 p.p.m. equivalent carbon response, 1 p.p.m. carbon monoxide, 400 p.p.m. (0.04 mole percent) carbon dioxide and 0.1 p.p.m. nitric oxide.

(3) Set the CO and CO_2 analyzer gains to give the desired ranges. Select the desired attenuation scale of the HC analyzer, set the sample capillary flow rate by adjusting the back pressure regulator, and adjust the electronic gain control, if provided, to give the desired range. Select the desired scale of the NOx analyzer and adjust the phototube high voltage supply or amplifier gain to give the desired range.

(4) Calibrate the HC analyzer with propane (air diluent) gases having nominal concentrations equal to 50 and 100 percent of full scale. Calibrate the CO analyzer with carbon monoxide (nitrogen diluent) gases and the CO_2 analyzer with carbon dioxide (nitrogen diluent) gases having nominal concentrations equal to 10, 25, 40, 50, 60, 70, 85, and 100 percent of full scale. Calibrate the NOx analyzer with nitric oxide (nitrogen diluent) gases having nominal concentrations equal to 50 and 100 percent of full scale. The actual concentrations should be known to within ±2 percent of the true values.

(5) Compare values obtained on the CO and CO_2 analyzers with previous calibration curves. Any significant change reflects some problem in the system. Locate and correct problem, and recalibrate. Use best judgment in selecting curves for data reduction.

(6) NOx converter efficiency determination. The apparatus described and illustrated in Figure 6 or Figure 7 is to be used to determine the conversion efficiency of devices that convert NOx to NO. The following procedure is to be used for determining the values to be used in Equation (A).

(i) Attach the NO/N_2 supply (150-250 p.p.m.) at C2, the O_2 supply at C1 and the analyzer inlet connection to the efficiency detector at C3. If lower concentrations of NO are used, air may be used in place of O_2 to facilitate better control of the NO_2 generated during step (iv).

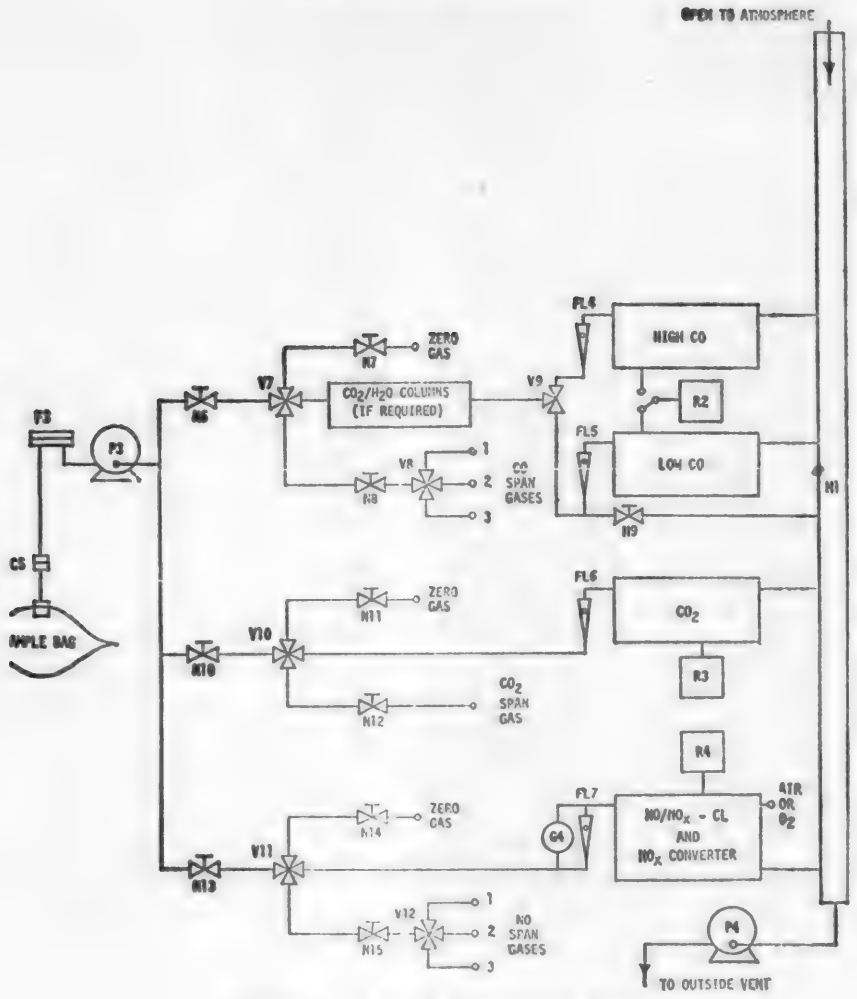

Figure 4 Exhaust Gas Analytical System

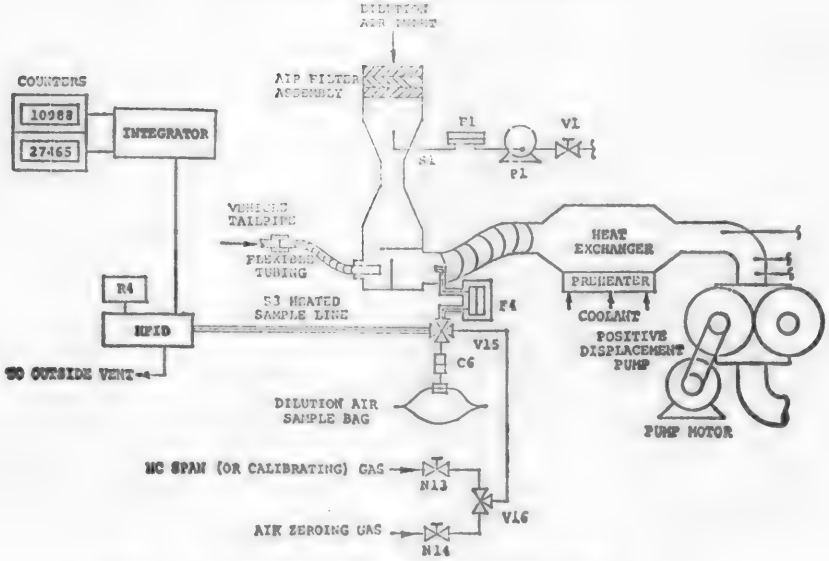

Figure 5 Diesel Hydrocarbon Continuous Analysis System

(ii) A leak-tight connector and tube to the vehicle tailpipe. The tubing shall be sized and connected in such a manner that the static pressure variations in the vehicle tailpipe(s) remain within ±5 inches of water of the static pressure variations measured during a dynamometer driving cycle with no connection to the tailpipe(s). Sampling systems capable of tolerances of ±1 inch of water will be used by the Administrator if a written request by the manufacturer substantiates the need for this closer tolerance.

(iii) A heating system to preheat the heat exchanger to within ±10° F of its operating temperature before the test begins.

(iv) A heat exchanger capable of limiting the gas mixture temperature variation during the entire test to ±10° F as measured at a point immediately ahead of the positive displacement pump.

(v) A positive displacement pump to pump dilute exhaust mixture. The pump capacity (300 to 350 c.f.m. is sufficient for testing most vehicles) shall be large enough to virtually eliminate water condensation in the system. See Appendix III to 40 CFR 86 for one flow calibration technique. Other suitable calibration techniques may be used if approved in advance by the Administrator.

(vi) Temperature sensor (T1) with an accuracy of ±2° F to allow continuous recording of the temperature of the dilute exhaust mixture entering positive displacement pump.

(vii) Gage (G1) with an accuracy of ±3 mm. Hg to measure the pressure depression of the dilute exhaust mixture entering the positive displacement pump, relative to atmospheric pressure.

(viii) Gage (G2) with an accuracy of ±3 mm. Hg to measure the pressure increase across the positive displacement pump.

(ix) Sample probes (S1, S2, and S3) pointed upstream to collect samples from the dilution air steam and the dilute exhaust mixture. Additional sample probes may be used, for example, to obtain continuous concentration traces of the dilute exhaust stream. In such case the sample flow rate, in standard cubic feet per test phase, must be added to the calculated dilute exhaust volume. The position of the sample probes in Figure 3 is pictorial only. The heated sample line (S3) between the sampling point and the analyzer shall be as short as possible.

(x) Filters (F1 and F2) to remove particulate matter from dilution air and dilute exhaust samples.

(xi) Pumps (P1 and P2) to pump the dilution air and dilute exhaust into their respective sample collection bags.

(xii) Flow control valves (N1 and N2) to regulate flows to sample collection bags, at constant flow rates. The minimum sample flow rate shall be 10 c.f.h.

(xiii) Flowmeters (FL1 and FL2) to insure, by visual observation, that constant flow rates are maintained throughout the test.

(xiv) Three-way solenoid valves (V1, V2, V3, and V4) to direct sample streams to either their respective bags or overboard.

(xv) Quick-connect, leak-tight fittings (C1, C2, C3, and C4) with automatic shutoff on bag side to attach sample bags to sample system.

(xvi) Sample collection bags for dilution air and exhaust samples of sufficient capacity so as not to impede sample flow.

(xvii) Revolution counters to count the revolutions of the positive displacement pump while each test phase is in progress and samples are being collected.

(3) Component description (exhaust gas batch analytical system). The following components will be used in the exhaust gas batch analytical system for testing under the regulations in this part. The analytical system provides for the determination of carbon monoxide and carbon dioxide concentrations by nondispersive infrared (NDIR) analysis and the determination of oxides of nitrogen concentrations by chemiluminescence (CL) analysis in dilute exhaust samples. The chemiluminescence method of analysis requires that the nitrogen dioxide present in the sample be converted to nitric oxide before analysis. Other types of analyzers may be used if shown to yield equivalent results and if approved in advance by the Administrator. (See Figure 4.)

(i) Quick-connect, leak-tight fitting (C5) to attach sample bags to analytical system.

(ii) Filter (F3) to remove any residual particulate matter from the collected sample.

(iii) Pump (P3) to transfer samples from the sample bags to the analyzers.

(iv) Selector valves (V7, V8, V9, V10, V11, and V12) for directing samples, span gases or zeroing gases to the analyzers.

(v) Flow control valves (N6, N7, N8, N9, N10, N11, N12, N13, N14, and N15) to regulate the gas flow rates.

(vi) Flowmeters (FL4, FL5, FL6, and FL7) to indicate gas flow rates.

(vii) Pressure gauge (G4) to facilitate greater precision in setting and reading flow rate.

(viii) Manifold (M1) to collect the expelled gases from the analyzers.

(ix) Pump (P4) to transfer expelled gases from the collection manifold to a vent external to the testroom (optional).

(x) Analyzers to determine carbon monoxide, carbon dioxide and oxides of nitrogen concentrations.

(xi) Sample conditioning column containing $CaSO_4$, or indicating silica gel to remove water vapor and containing ascraite to remove carbon dioxide from the CO analyses stream.

NOTE.—If CO instruments which are essentially free of CO_2 and water vapor interference are used, the use of the conditioning column may be deleted.

A CO instrument will be considered to be essentially free of CO_2 and water vapor interference if its response to a mixture of 3 percent CO_2 in N_2, which has been bubbled through water at room temperature (68°–86° F), produces an equivalent CO response, as measured on the most sensitive CO range, which is less than 1 percent of full scale CO concentration on instrument ranges above 300 ppm CO or less than 3 ppm on instrument ranges below 300 ppm CO.

(xii) Recorders (R1, R2, and R3) or digital printers to provide permanent records of calibration, spanning and sample measurements; or in those facilities where computerized data acquisition systems are incorporated, the computer facility printout may be used.

(4) Component description (exhaust gas continuous analytical system). The following components will be used in the exhaust gas continuous analytical system for testing under the regulations in this part. This analytical system provides for the continuous determination of exhaust hydrocarbon concentration by heated flame ionization detector (HFID) analysis. Other types of analyzers may be used if shown to yield equivalent results and if approved in advance by the Administrator (See Figure 5.)

(i) Heated continuous sampling line (S3).

(ii) Heated filter (F4) to remove particulate matter from heated hydrocarbon sample.

(iii) Selector valves (V5 and V6) for directing the continuous dilute exhaust sample, dilution air bag sample, span or zeroing gases to the analyzers.

(iv) Quick-connect, leak-tight fitting (C6) to attach dilution air sample bag to analytical system.

(v) Heated hydrocarbon analyzer (HFID) complete with heated pump, filter, and flow control system. The response time of this instrument shall be less than 1 second for 90 percent of full scale response. Sample transport time from sampling point to inlet of instrument shall be less than 4 seconds.

(vi) Chart recorder (R1) and analog integrator with two readouts, or chart recorder (R1) and on-line digital computer for manual or electronic integration of analyzer output signal during the three operating phases of the test.

(vii) Flow control valves (N4 and N5) to regulate the gas flow rates.

XII. *Analytical system calibration and sample handling.* (a) Calibrate the analytical assembly at least once every 30 days. Use the same flow rate as when analyzing samples.

(1) Adjust analyzers to optimize performance. For Diesel vehicles, operate the heated hydrocarbon analyzer, sampling line and filter to ±10° F in the temperature range of 300° to 390° F.

(2) Zero the hydrocarbon analyzer with zero grade air and the carbon monoxide, carbon dioxide, and oxides of nitrogen analyzers with zero grade air or zero grade nitrogen. The allowable zero gas impurity concentrations should not exceed 1 p.p.m. equivalent carbon response, 1 p.p.m. carbon monoxide, 400 p.p.m. (0.04 mole percent) carbon dioxide and 0.1 p.p.m. nitric oxide.

(3) Set the CO and CO_2 analyzer gains to give the desired ranges. Select the desired attenuation scale of the HC analyzer, set the sample capillary flow rate by adjusting the back pressure regulator, and adjust the electronic gain control, if provided, to give the desired range. Select the desired scale of the NOx analyzer and adjust the phototube high voltage supply or amplifier gain to give the desired range.

(4) Calibrate the HC analyzer with propane (air diluent) gases having nominal concentrations equal to 50 and 100 percent of full scale. Calibrate the CO analyzer with carbon monoxide (nitrogen diluent) gases and the CO_2 analyzer with carbon dioxide (nitrogen diluent) gases having nominal concentrations equal to 10, 25, 40, 50, 60, 70, 85, and 100 percent of full scale. Calibrate the NOx analyzer with nitric oxide (nitrogen diluent) gases having nominal concentrations equal to 50 and 100 percent of full scale. The actual concentrations should be known to within ±2 percent of the true values.

(5) Compare values obtained on the CO and CO_2 analyzers with previous calibration curves. Any significant change reflects some problem in the system. Locate and correct problem, and recalibrate. Use best judgment in selecting curves for data reduction.

(6) NOx converter efficiency determination. The apparatus described and illustrated in Figure 6 or Figure 7 is to be used to determine the conversion efficiency of devices that convert NOx to NO. The following procedure is to be used for determining the values to be used in Equation (A).

(i) Attach the NO/N_2 supply (150-250 p.p.m.) at C2, the O_2 supply at C1 and the analyzer inlet connection to the efficiency detector at C3. If lower concentrations of NO are used, air may be used in place of O_2 to facilitate better control of the NO_2 generated during step (iv).

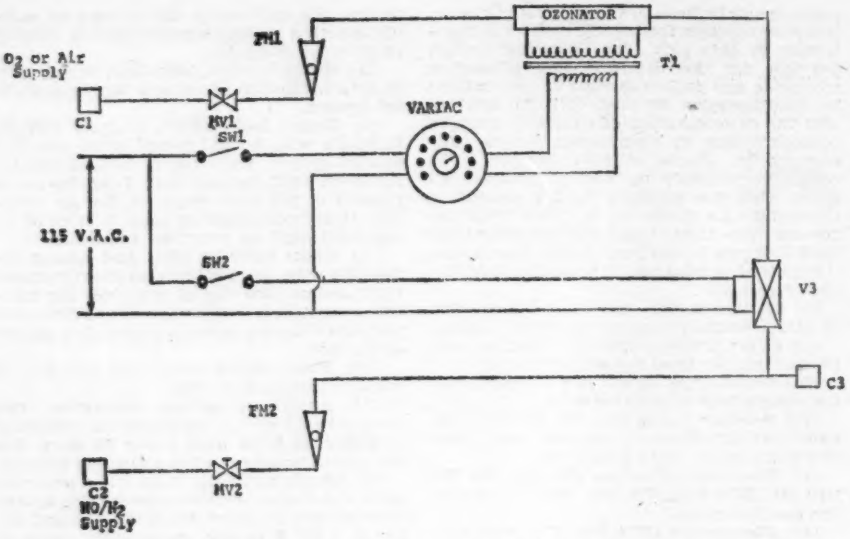

Figure 6 - NOx Converter Efficiency Detector

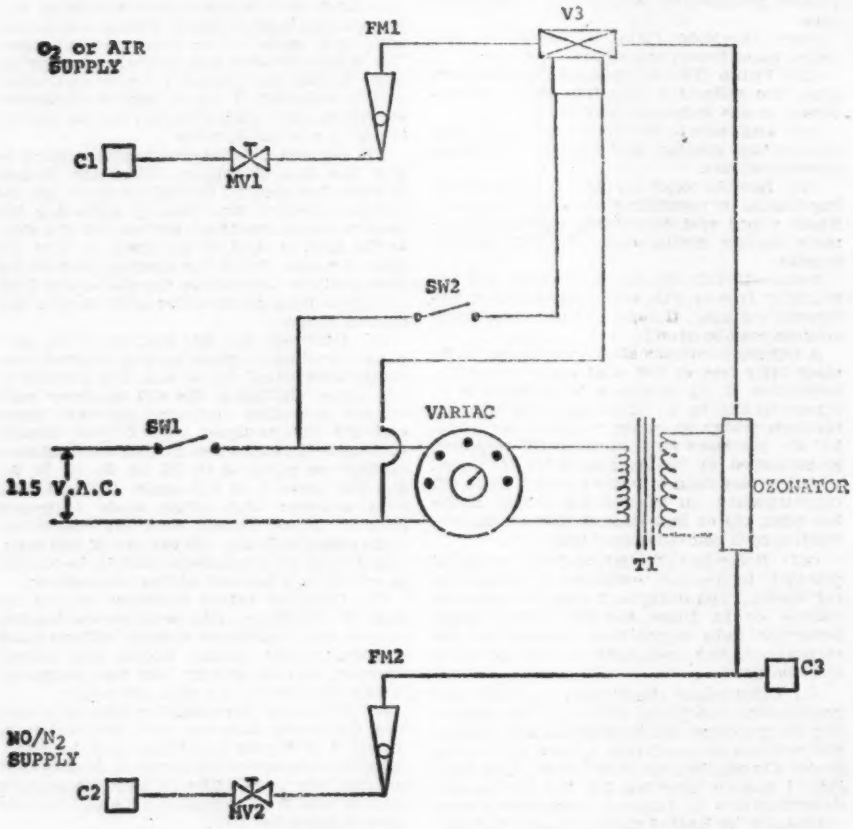

Figure 7 - NOx Converter Efficiency Detector

(ii) With the efficiency detector variac off, place the NOx converter in bypass mode and close valve V3. Open valve MV2 until sufficient flow and stable readings are obtained at the analyzer. Zero and span the analyzer output to indicate the value of the NO concentration being used. Record this concentration.

(iii) Open valve V3 (on/off flow control solenoid valve for O_2) and adjust valve MV1 (O_2 supply metering valve) to blend enough O_2 to lower the NO concentration (ii) about 10 percent. Record this concentration.

(iv) Turn on the ozonator and increase its supply voltage until the NO concentration of (iii) is reduced to about 20 percent of (ii). NO_2 is now being formed from the $NO+O_2$ reaction. There must always be at least 10 percent unreacted NO at this point. Record this concentration.

(v) When a stable reading has been obtained from (iv), place the NOx converter in the convert mode. The analyzer will now indicate the total NOx concentration. Record this concentration.

(vi) Turn off the ozonator and allow the analyzer reading to stabilize. The mixture $NO+O_2$ is still passing through the converter. This reading is the total NO_x concentration of the dilute NO span gas used at Step (iii). Record this concentration.

(vii) Close valve V3. The NO concentration should be equal to or greater than the reading of (ii) indicating whether the NO contains any NO_2. Calculate the efficiency of the NOx converter by substituting the concentrations obtained during the test into Equation (A).

$$\% \text{ Eff.} = (v) - (iv) / (vi) - (iv) \times 100 \text{ percent} \quad (A)$$

The efficiency of the converter should be greater than 90 percent. Adjustment of the converter temperature may be needed to maximize the efficiency. Efficiency checks should be made on each analyzer range using an NO span gas concentration appropriate to the instrument range. See alternate procedure in paragraph (a)(6)(viii).

(viii) Alternative to paragraph (a)(6)(vii): Close valve V3. The NO concentration should be equal to or greater than the reading of (ii) indicating whether the NO contains any NO_2.

Calculate the efficiency of the NO converter by substituting the concentrations obtained during the test into Equation (B).

$$\% \text{ Eff.} = 1 + (v-vi) / (iii-iv) \times 100 \text{ percent} \quad (B)$$

The efficiency of the converter should be greater than 90 percent. Adjusting the converter temperature may be needed to maximize the efficiency. Although steps (ii) and (vii) are not used in the calculations, their values should be recorded to complete the data set for the test sequence. This procedure does not depend on the amount of NO_2 in the span gas nor the equivalence of flows in the bypass and converter modes; however, to be consistent with good operating practice, flows should be nominally the same, and the NO_2 concentration. Efficiency checks should be made at a frequency (daily to weekly) consistent with good quality assurance provisions.

(7) Check the efficiency of the sample conditioning system, if used, by the following procedure:

(i) Zero and span the CO instrument on its most sensitive scale.

(ii) Recheck zero.

(iii) Bubble a mixture of 3% CO_2 in N_2 through water at room temperature (68°-

86° F), through the conditioning column into the CO instrument. If the response meets the criteria of Section XI(a)(3)(xi) or Section XI(b)(3)(xi) as applicable, then the conditioning column is functioning acceptably. If the response is higher than the specified limit, a new conditioning column should be installed and the test repeated.

(iv) Sample conditioning systems should be checked at a frequency consistent with observed column life or when the indicator of the column packing begins to show deterioration.

(b) HC, CO, CO_2, and NOx measurements: (When testing Diesel vehicles allow the HC analyzer sample line and filter to heat to a set point ±10° F between 300° and 390° F.) Allow a minimum of 20 minutes warmup for the HC analyzer and 2 hours for the CO, CO_2, and NOx analyzers. (Power is normally left on infrared and chemiluminescence analyzers; but when not in use, the chopper motors of the infrared analyzers are turned off and the phototube high voltage supply of the chemiluminescence analyzer is placed in the standby position.) The following sequences of operations should be performed in conjunction with each series of measurements:

(1) Zero the analyzers. Obtain a stable zero on each amplifier meter and recorder. Recheck after tests.

(2) Introduce span gases and set the CO and CO_2 analyzer gains, the HC analyzer sample capillary flow rate and the NOx analyzer high voltage supply or amplifier gain to match the calibration curves. In order to avoid corrections, span and calibrate at the same flow rates used to analyze the test samples. Span gases should have concentrations equal to approximately 80 percent of full scale. If gain has shifted significantly on the CO or CO_2 analyzers, check tuning. If necessary, check calibration. Recheck after test. Show actual concentrations on chart.

(3) Check zeros; repeat the procedure in paragraphs (b) (1) and (2) of this section if required.

(4) Check flow rates and pressures.

(5) For Diesel vehicles continuously record (and integrate electronically, if desired) dilute hydrocarbon emission levels during test.

(6) Measure CO, CO_2, and NOx concentrations of samples, also HC for gasoline-fueled vehicles. Care should be exercised to prevent moisture from condensing in the sample collection bag.

(7) Check zero and span points.

(c) For the purposes of this section, the term "zero grade air" includes artificial "air" consisting of a blend of nitrogen and oxygen with oxygen concentrations between 18 and 21 mole percent.

XIII. *Dynamometer test runs.* (a) The vehicle shall be allowed to stand with the engine turned off for a period of not less than 12 hours before the cold start exhaust emission test (gasoline-fueled vehicles shall be stored at an ambient temperature specified in Section IV of this appendix). The vehicle shall be stored prior to the emission tests in such a manner that precipitation (e.g. rain or dew) does not occur on the vehicle. The complete dynamometer test consists of a cold start drive of 7.5 miles and simulates a hot start drive of 7.5 miles. The vehicle is allowed to stand on the dynamometer during the 10-minute time period between the cold and hot start tests. The cold start test is divided into two periods. The first period, representing the cold start "transient" phase, terminates at the end of the deceleration which is scheduled to occur at 505 seconds of the driving schedule. The second period, representing the "stabilized" phase, consists of the remainder of driving schedule including engine shutdown. The hot start test similarly consists of two periods. The first period, representing the hot start "transient" phase, terminates at the same point in the driving schedule as the first phase of the cold start test. The second period of the hot start test, "stabilized" phase, is assumed to be identical to the second period of the cold start test. Therefore, the hot start test terminates after the first period (505 seconds) is run. During the tests the ambient temperature shall be between 68° F and 86° F.

(b) The following steps shall be taken for each test:

(1) Place drive wheels of vehicle on dynamometer without starting engine.

(2) Open the vehicle engine compartment cover and start the cooling fan.

(3) With the sample solenoid valves in the "dump" position connect evacuated sample collection bags to the two dilute exhaust sample connectors and to the two dilution air sample line connectors.

(4) Start the positive displacement pump (if not already on), the sample pumps, heated hydrocarbon analysis recorder (Diesel only) and the temperature recorder. (The heat exchanger of the constant volume sampler, the Diesel hydrocarbon analyzer continuous sample line and filter (if applicable) should be preheated to their respective operating temperatures before the test begins.)

(5) Adjust the sample flow rates to the desired flow rate (minimum of 10 c.f.h.) and set the revolution counters to zero. Also set Diesel hydrocarbon integrator counters to zero, if applicable.

(6) Attach the flexible exhaust tube to the vehicle tailpipe(s).

(7) Simultaneously start the revolution counter for the positive displacement pump, position the sample solenoid valves to direct the sample flow into the "transient" exhaust sample bag and the "transient" dilution air sample bag (turn on the Diesel hydrocarbon analyzer system integrator and mark the recorder chart, if applicable), and start cranking the engine.

(8) Fifteen seconds after the engine starts, place the transmission in gear.

(9) Twenty seconds after the engine starts, begin the initial vehicle acceleration of the driving schedule.

(10) Operate the vehicle according to the dynamometer driving schedule (Section V).

(11) At the end of the deceleration which is scheduled to occur at 505 seconds, simultaneously switch the sample flows from the "transient" bags to the "stabilized" bags, switch off revolution counter No. 1 (and the Diesel hydrocarbon integrator No. 1, mark the Diesel hydrocarbon recorder chart) and start counter No. 2 (and the Diesel hydrocarbon integrator No. 2). As soon as possible and in no case longer than 20 minutes after the end of this portion of the test disconnect the "transient" exhaust and dilution air sample bags, transfer them to the analytical system and process the samples according to Section XII.

(12) Turn the engine off 2 seconds after the end of the last deceleration (at 1,369 seconds).

(13) Five seconds after the engine stops running, simultaneously turn off revolution counter No. 2 (and the Diesel hydrocarbon integrator No. 2, mark the hydrocarbon recorder chart, if applicable) and position the sample solenoid valves to the "dump" position. As soon as possible and in no case longer than 20 minutes after the end of this portion of the test disconnect the "stabilized" exhaust and dilution air sample bags, transfer them to the analytical system and process the samples according to Section XII.

(14) Immediately after the end of the sample period turn off the cooling fan and close the engine compartment cover.

(15) Turn off the positive displacement pump or disconnect the exhaust tube from the tailpipe(s) of the vehicle.

(16) Repeat the steps in paragraphs (b)(2) through (10) of this section for the hot start test except only one evacuated sample bag is required for sampling exhaust gas and one for dilution air. The step in paragraph (b)(7) of this section shall begin between 9 and 11 minutes after the end of the sample period for the cold start test.

(17) At the end of the deceleration which is scheduled to occur at 505 seconds, simultaneously turn off the No. 1 revolution counter (and Diesel hydrocarbon integrator No. 1, mark the Diesel hydrocarbon recorder chart, if applicable) and position the sample solenoid valve to the "dump" position. (Engine shutdown is not part of the hot start test sample period.)

(18) As soon as possible and in no case longer than 20 minutes after the end of this portion of the test disconnect the hot start "transient" exhaust and dilution air sample bags, transfer them to the analytical system and process the samples according to Section XII.

(19) Disconnect the exhaust tube from the vehicle tailpipe(s) and the vehicle may be removed from the dynamometer.

(20) The positive displacement pump may be turned off, if desired.

XIV. *Chart reading.* (a) Gasoline-fueled light duty vehicles and light duty trucks:

(1) Determine the HC, CO, CO_2, and NOx concentrations of the dilution air and dilute exhaust sample bags from the instrument deflections or recordings making use of appropriate calibration charts.

(2) Determine the average dilute exhaust mixture temperatures from the temperature recorder trace if the recorder is used.

(b) Diesel light duty vehicles and light duty trucks:

(1) Determine the HC, CO, CO_2, and NOx concentrations of the dilution air and the CO, CO_2, and NOx concentration of the dilute exhaust sample bags from the instrument deflections, computer printout, or recordings making use of appropriate calibration charts.

(2) Record integrated HC results, or manually integrate continuous chart. This chart provides a permanent record and can be graphically integrated if verification of the results of electronic integration is required.

(3) Determine the average dilute exhaust mixture temperatures from the temperature recorder trace if a recorder is used.

XV. *Calculations.* The individual reported test results shall be computed by use of the following formula:

(a) For light duty vehicles and light duty trucks:

$$Ywm = (0.43\ Yct + 0.57\ Yht + Ys)/7.5$$

Where:

Ywm = Weighted mass emissions of each pollutant, i.e. HC, CO, or NOx, in grams per vehicle mile.

Yct = Mass emissions as calculated from the "transient" phase of the cold start test, in grams per test phase.

Yht = Mass emissions as calculated from the "transient" phase of the hot start test, in grams per test phase.

Ys = Mass emissions as calculated from the "stabilized" phase of the cold start test, in grams per test phase.

(b) The mass of each pollutant for each phase of both the cold start test and hot start test is determined from the following:

(1) Hydrocarbon Mass:

$$HCmass = Vmix \times DensityHC \times HCconc/1{,}000{,}000$$

(2) Oxides of nitrogen Mass:

$$NOxmass = Vmix \times DensityNO_2 \times (NOxconc/1{,}000{,}000) \times KH$$

(3) Carbon monoxide Mass:

$$COmass = Vmix \times DensityCO \times COconc/1{,}000{,}000$$

(c) Meaning of symbols:

HCmass = Hydrocarbon emissions, in grams per test phase.

DensityHC = Density of hydrocarbons in the exhaust gas, assuming an average carbon to hydrogen ratio of 1:1.85, in grams per cubic foot at 68° F. and 760 mm. Hg pressure (16.33 gm./cu. ft.).

HCconc = Hydrocarbon concentration of the dilute exhaust sample corrected for background, in p.p.m. carbon equivalent, i.e. equivalent propane × 3.

$$HCconc = HCe - HCd(1 - 1/DF)$$

Where:

HCe = Average hydrocarbon concentrations of the dilute exhaust sample as measured from the sample bag or as calculated from the integrated HC traces, in p.p.m. carbon equivalent.

HCd = Hydrocarbon concentration of the dilution air as measured in p.p.m. carbon equivalent.

NOxmass = Oxides of nitrogen emissions, in grams per test phase.

$DensityNO_2$ = Density of oxides of nitrogen in the exhaust gas, assuming they are in the form of nitrogen dioxide, in grams per cubic foot at 68° F. and 760 mm. Hg pressure (54.16 gm./cu. ft.).

NOxconc = Oxides of nitrogen concentration of the dilute exhaust sample corrected for background, in p.p.m.

$$NOxconc = NOxe - NOxd(1 - 1/DF)$$

Where:

NOxe = Oxides of nitrogen concentration of the dilute exhaust sample as measured, in p.p.m.

NOxd = Oxides of nitrogen concentration of the dilution air as measured, in p.p.m.

COmass = Carbon monoxide emissions, in grams per test phase.

DensityCO = Density of carbon monoxide in grams per cubic foot at 68° F. and 760 mm. Hg pressure (32.97 gm./cu. ft.).

COconc = Carbon monoxide concentration of the dilute exhaust sample corrected for background, water vapor and CO_2 extraction, in p.p.m.

$$COconc = COe - COd\ (1 - 1/DF)$$

Where:

COe = Carbon monoxide concentration of the dilute exhaust sample volume corrected for water vapor and carbon dioxide extraction, in p.p.m. The calculation assumes the carbon to hydrogen ratio of the fuel is 1:1.85.

$$COe = (1 - 0.01925\ CO_2e - 0.000323R)\ COem$$

Where:

COem = Carbon monoxide concentration of the dilute exhaust sample as measured in p.p.m.

CO_2e = Carbon dioxide concentration of the dilute exhaust sample, in mole percent.

R = Relative humidity of the dilution air, in percent.

COd = Carbon monoxide concentration of the dilution air corrected for water vapor extraction, in p.p.m.

$$COd = (1 - 0.000323R)\ COdm$$

Where:

COdm = Carbon monoxide concentration of the dilution air sample as measured, in p.p.m.

NOTE.—If a CO instrument which meets the criteria specified in Section XI(a)(3)(xi) or Section XI(b)(3)(xi) is used and the conditioning column has been deleted, COem can be substituted directly for COe and COdm can be substituted directly for COd.

$$DF = \frac{13.4}{CO_{2e} + (HC_e + CO_e) \times 10^{-4}}$$

Vmix = Total dilute exhaust volume in cubic feet per test phase corrected to standard conditions (528° R and 760 mm. Hg).

$$Vmix = Vo \times N \frac{(P_B - P_4)\ (528°\ R)}{(760\ mm.\ Hg)\ (Tp)}$$

Where:

Vo = Volume of gas pumped by the positive displacement pump, in cubic feet per revolution. This volume is dependent on the pressure differential across the positive displacement pump. (See calibration techniques in Appendix III to 40 CFR 86.)

N = Number of revolutions of the positive displacement pump during the test phase while samples are being collected.

PB = Barometric pressure in mm. Hg.

P4 = Pressure depression below atmospheric measured at the inlet to the positive displacement pump.

Tp = Average temperature of dilute exhaust entering positive displacement pump during test while samples are being collected, in degrees Rankine.

KH = Humidity correction factor.

$$KH = 1/1 - 0.0047(H - 75)$$

NOTE.—The constant 0.0047 will be updated to reflect any data which becomes available on Light-Duty Diesel engine tests.

Where:

H = Absolute humidity in grains of water per pound of dry air.

$$H = ((43.478)\ Ra \times Pd)/(PB - (Pd \times Ra/100))$$

Ra = Relative humidity of the ambient air, in percent.

Pd = Saturated vapor pressure, in mm. Hg. at the ambient dry bulb temperature.

(d) Example calculation of mass emissions values:

(1) For the "transient" phase of the cold start test assume Vo = 0.29344 cu. ft. per revolution; N = 10,485; R = 48.0 percent; Ra = 48.2 percent; PB = 762 mm. Hg; Pd = 22.225 mm. Hg; P4 = 70 mm. Hg; Tp = 570° R; HCe = 105.8 p.p.m. carbon equivalent; NOxe = 11.2 p.p.m.; COem = 306.6 p.p.m.; CO_2e = 1.43 percent; HCd = 12.1 p.p.m.; NOxd = 0.8 p.p.m.; COdm = 15.3 p.p.m. Then:

$$Vmix = (0.29344)\ (10{,}485)\ (762 - 70)\ (528)/(760)\ (570) = 2595.0\ \text{cu. ft. per test phase.}$$

$$H = (43.478)\ (48.2)\ (22.225)/762 - (22.225 \times 48.2/100).$$

$$Kh = 1/1 - 0.0047(62 - 75) = .9424.$$

$$COe = (1 - 0.01925(1.43) - 0.000323(48))\ 306.0 = 293.4\ \text{p.p.m.}$$

$$COd = (1 - 0.000323(48))\ 15.3 = 15.1\ \text{p.p.m.}$$

$$DF = 13.4/1.43 + (105.8 + 293.4) \times 10 - 4 = 9.116.$$

$$HCconc = 105.8 - 12.1(1 - 1/9.116) = 95.03.$$

$$HCmass = (2595)\ (16.33)\ (95.03/1{,}000{,}000) = 4.027\ \text{grams per test phase.}$$

$$NOxconc = 11.2 - 0.8(1 - 1/9.116) = 10.49.$$

$$NOxmass = (2595)\ (54.16)\ (10.49/1{,}000{,}000)\ (0.9424) = 1.389\ \text{grams per test phase.}$$

$$COconc = 293.4 - 15.1(1 - 1/9.116) = 280.$$

$$COmass = (2595)\ (32.97)\ (280.1{,}000{,}000) = 23.96\ \text{grams per test phase.}$$

(2) For the "stabilized" portion of the cold start test assume that similar calculations resulted in HCmass = 0.62 grams per test phase; NOxmass = 1.27 grams per test phase; and COmass = 5.98 grams per test phase.

(3) For the "transient" portion of the hot start test assume that similar calculations resulted in HCmass = 0.51 grams per test phase; NOxmass = 1.38 grams per test phase; and COmass = 5.01 grams per test phase.

(4) Results:

$$HCwm = ((0.43)\ (4.027) + (0.57)\ (0.51) + 0.62)/7.5 = 0.352\ \text{grams per vehicle mile.}$$

$$NOxwm = ((0.43)\ (1.389) + (0.57)\ (1.38) + 1.27)/7.5 = 0.354\ \text{grams per vehicle mile.}$$

$$COwm = ((0.43)\ (23.96) + (0.57)\ (5.01) + 5.98)/7.5 = 2.55\ \text{grams per vehicle mile.}$$

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